RAILROAD GAZETTE

FRIDAY, MARCH 29, 1901.

CONTENTS

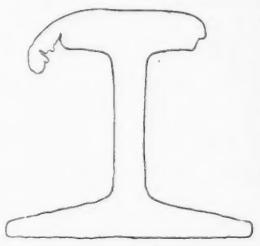
Contributions

Measuring the Wear of Rails.

Indianapolis, March 15.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I read with interest Mr. Baldwin's suggestions as to observations of the life history of rails published in the *Railroad Gazette* of March 8. His scheme for measuring the wear is ingenious, and particularly in the matter of maintaining fixed points from which to measure. The sketch inclosed will show, however, that there would sometimes be difficulty in keeping these points even by his plan. This is from a 70-lb. rail which had been in track two years on the inside of a curve.



M. W. MANSFIELD.

Driving Wheels Slipping on Down Grade.

Chicago, March 23, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

At the February meeting of the Rocky Mountain Railway Club an odd question was discussed, one that I have never seen before in print. The question was: "Do driving wheels of locomotives slip when running down grade in forward motion with the steam shut off?" From explanations which came out at the meeting, by "slipping" is meant a spinning of the driving wheels such as often occurs in starting on a bad rail. The question was first as to whether this slipping really occurs and next as to its cause.

Evidently there were a number who were skeptical, but many instances were cited where locomotives were said to have acted in this manner. That is, under certain conditions in drifting rapidly down grade, the driving wheels may spin or turn much faster than the speed of the train would warrant. Further, this slipping in several cases has been given as the cause for bent side rods and pins. It also was brought out that this slipping had only been noticed where the rail conditions were bad; early in the morning on track running through low lands, and when the engine was drifting at high speed.

Mr. C. H. Quereau was of the opinion that this slipping was due primarily to the crank pins being out of quarter, and others considered it due to faulty counterbalancing, but the explanations were not clear.

I have heard of this slipping before, and have accounted for it in a different way, which may be taken for what it is worth. The slipping only occurs when the engine is running fast and on sections of bad track. My theory is that the slipping is caused by striking a section of bad rail at high speed, when a lot of energy is stored up in the driving wheels. The adhesion between the wheels and rails being suddenly reduced, the wheels spin until they are stopped by an application of the brakes, or the bad rail is passed. The pins and side rods are probably damaged at the time when the engine goes from the bad rail to rail in good condition. Then the front drivers are stopped while the rear ones are still slipping, so that the pins and rods are subjected to unusual forces. The same thing is likely to happen if the engineman attempts to use sand when the drivers are slipping in this way. I believe that many enginemen have learned from experience that the thing to do in a case of this kind is to stop the wheels spinning by applying the brakes.

A. B.

This is not in accord with my observation. The indications seem clear that some members tried to squelch this matter, without hurting anybody's feelings, while it was under discussion, when it was said that the wheels probably were not properly quartered or counterbalanced.

I have ridden prone on the run-boards of locomotives having driving wheels 57 in., 69 in. and 77 in. in diameter, in all kinds of weather, on all kinds of track, up grade and down, observing the action of running parts at speeds ranging from starting up to 65 miles an hour. I have never seen the slightest indication of the injurious action here referred to, and believe that it does not exist in any well-built engine. If the theory advanced by A. B. were true, rods and pins would daily be destroyed in starting engines from the station, when wheels often slip at a rate which represents a greater speed than 50 miles an hour, and are caught up instantly on sand, with the steam on or with it off, and without apparent injury to rods or pins. This is rough usage, and certainly not to be recommended, but it is safely done when the circumstances seem to justify it.

It seems to be begging the question to assume that material injury can be done by halting, in the way described, the forward wheels of a locomotive running at any speed (and having even the longest wheel base) while the back wheels are still on a bad rail. If this condition ever did exist, to the extent of injuring the rods and pins, it must have been on an engine that was so badly designed that this was the least of its trouble. The question that was discussed seems to have been based upon a far-fetched theory.

H.

Long Mileage by a Pooled Engine.

Northern Pacific Railway Company,
Missoula, Mont., March 20, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

Several accounts of the performance of pooled engines in passenger service on various roads have appeared in the *Railroad Gazette* during the past few years, some of which were very creditable. I have seen nothing, however, which for length of run, severity of service, weight of train pulled and mileage made, will compare with the record recently completed by an engine in heavy passenger service on the Rocky Mountain Division of the Northern Pacific Railway.

This record was made by engine 203, a Schenectady, ten-wheel, two-cylinder, compound, built in 1898; cylinders, 22 in. and 34 in. by 26 in.; weight on drivers 112,000 lbs.; weight on truck, 43,500 lbs.; diameter of drivers over tires, 69 in.; steam pressure, 200 lbs.; mileage between general repairs, 204,114 miles. During the time this mileage was being made, the engine received nothing but ordinary round-house running repairs, including such work as facing valves, renewing cylinder packing rings, rod bushings and brasses, keeping the valve motion up, changing tender and engine truck wheels on account of worn tread and sharp flanges, etc. The tires were not turned or changed, nor were any flues plugged or removed during this time.

We have nine engine crews pooled on four engines of this class on a run of 298 miles, pulling two overland trains consisting of from 8 to 14 cars on schedule carded at about 30 miles an hour between terminals. Engine crews are changed each trip, both east and west, at district terminal near the middle of the division.

In our favor we have nearly pure water for use in boilers, an exceptionally capable class of enginemen, and long and heavy mountain grades, which make it necessary to use driver brake for many miles, which, of course, assists materially in keeping driving tires in shape. The obstacles we have to overcome are all those which have from time to time been urged by those opposed to the pooling system as detrimental to the welfare of motive power.

F. P. BARNES,
Master Mechanic, R. M. Division.

Trolleys and Maximum Speeds.

March 25, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

Mr. A. L. Johnson, who is going to have a trolley road in operation to New York from Philadelphia "before the snow flies," seems to have got a little mixed between maximum and average speeds—if he is correctly reported by the newspapers. His plan is to build a railroad on a private right of way from Philadelphia to a point "down the bay" whence swift steamers are to take the passengers to the South Ferry. Exactly what is to be his northern terminus can be conjectured within a mile or two when we learn that his cars are to reach it in an hour and a half after leaving Philadelphia, and that they are to run at a speed of 50 miles an hour. It is quite a simple calculation to show from these figures that the point down the bay must be exactly 70 miles from Philadelphia—and unless his line is straighter than the present steam roads, it will be at least 15 miles from New York. So far all is serene, though the idea of going those 15 miles by steamer seems to demand a special brand of boat.

Despite the serenity of the occasion, Mr. Johnson has felt impelled to state in the public prints that his ground for saying that his cars will make 50 miles an hour is that the General Electric Company will guarantee such a speed. It is at this point that Mr. Johnson should be warned. He seems somewhat inexperienced in the art of running cars at high speeds, and he should know that while the General Electric people told him that they would guarantee a speed of 50 miles an hour they were probably alluding to a maximum speed with certain conditions of curvature and gradient that possibly Mr. Johnson has never met in his extensive experience with trolley lines.

Furthermore, Mr. Johnson should be warned that in a trip even of 75 miles, a maximum speed cannot in practice be maintained throughout. There is another kind of speed that the reporters have never heard of, and possibly Mr. Johnson is with them in this, a speed called an average speed, and to do Mr. Johnson's trick, he needs an average speed of 50 miles an hour. Now, this average speed is an exigent entity. It is like a trolleyman, and has a way of demanding things. What it usually demands is a maximum speed of at least 40 per cent. in excess of its own. So Mr. Johnson had better get the General Electric to guarantee a maximum speed of at least 70 miles an hour.

If Mr. Johnson doubts this we would advise his taking a trip to Philadelphia, going by one of the existent lines and returning by the other. He will find along each of these lines monuments situated a mile apart such as he has never seen on his trolley roads. If he has a watch with him and will note the time he passes these mile-posts, he will note many a mile run in less than 60 seconds. This will simply mean that the "average speed" is getting what it demands, and the standard lines are obliged to furnish a pretty high maximum speed to maintain their schedules.

It seems hard to discourage Mr. Johnson, but it is better to be discouraged than disappointed.

SUPERINTENDENT.

The Illinois Central Good Roads Movement.

We noted two or three weeks ago the fact that the Illinois Central is starting out a good roads train to go north from New Orleans to Chicago. The arrangement and scope of this enterprise are described in a letter recently received from Mr. Power, the Industrial Commissioner of the Illinois Central.

The equipment of the "good roads train" will consist of the following:

One car for engine, crusher, elevator and screen.
Car for roller, road machine, plows and scrapers.
Two gondolas for transferring stone, sewer pipe, etc.
One car of coal, including water tank.
One business car, or Pullman car, with commissary to supply two government engineers, one man representing the National Good Roads Association, two skilled operators for machinery.
A road department boarding car, with six laborers from the railroad to unload, feed crusher, work plows, scrapers, etc.

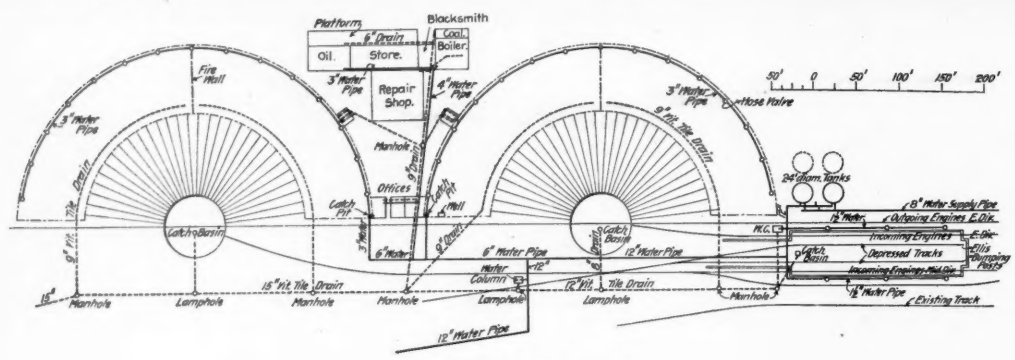
It is the idea to utilize as nearly as possible the material to be found in the immediate vicinity of the different places at which the train will stop. If they have stone good for macadam purposes, that will be used; if gravel, gravel will be used; if neither stone nor gravel, but clay that can be burned properly for use for road-making purposes, that will be used.

It is proposed to present a practical lesson to the farmers on the lines of the Illinois Central Railroad as to the possibilities in road making to develop their country roads, and they are to be shown by practical example in building sections of a half to a mile of road how the road is built, tiled, drained, topped and finished with the material the earth is composed of and nothing more.

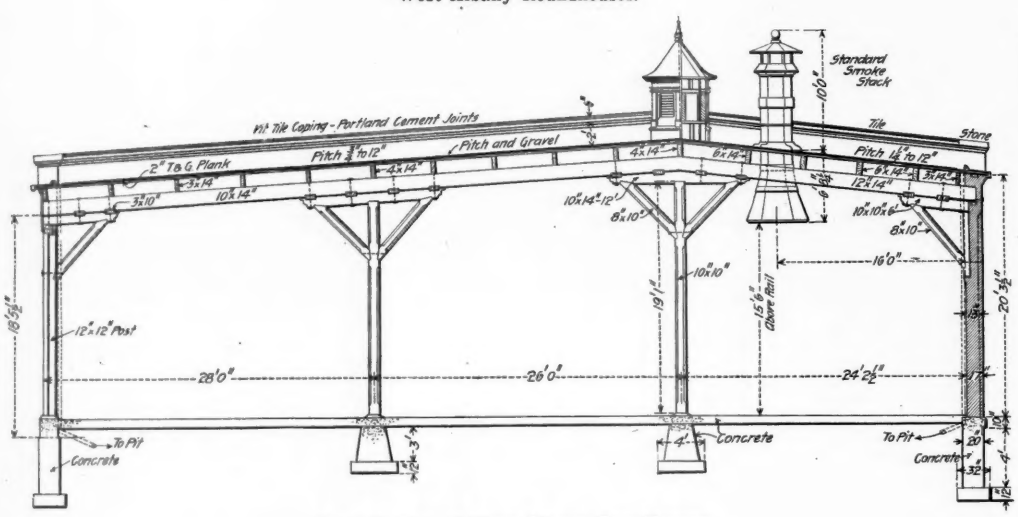
In order to work up a proper interest in this matter, Col. W. H. Moore, President of the National Good Roads Association, is now in the South, and has had conferences with the boards of trade, commercial organizations and officials of the cities of New Orleans, Vicksburg, Natchez and Jackson, Mich., and will gradually work up the line toward Chicago. At each one of these places meetings have been held, and the co-operation of these different points has been enlisted with a view to building the sample sections of road. It is the intention, when these roads are being built, that a good roads convention be held at the different points, and delegates from the different counties in the state be present and trains run for a distance of 200 miles at reduced fares, in order to make it a large and attractive convention and give as full information to the people of the state as possible.

The matter has only been taken up so far in the States of Mississippi and Louisiana, but in both of those states delegates have been appointed by the Governor from the different counties, and the Governors have joined heartily in the work of this good roads movement.

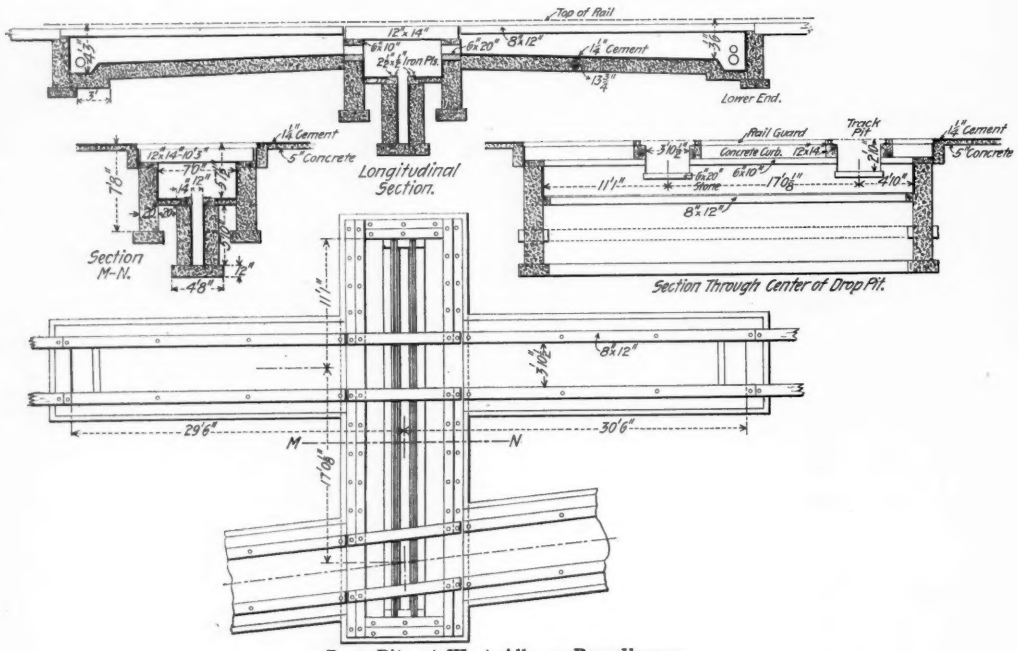
It is estimated that the trip of this train will occupy something like three months to cover the line between New Orleans and Chicago. It is expected at present that something like the following stops will be made, but this will be subject to change if necessary: New Orleans, La.; Natchez, Vicksburg, Jackson, Grenada, Winono or Oxford, Greenville, Miss.; Memphis, Jackson, Tenn.; Paducah, Owensboro, Louisville, Ky.; Cairo, Ill.; Evansville, Ind.; Mattoon, Champaign and Kankakee, Ill.



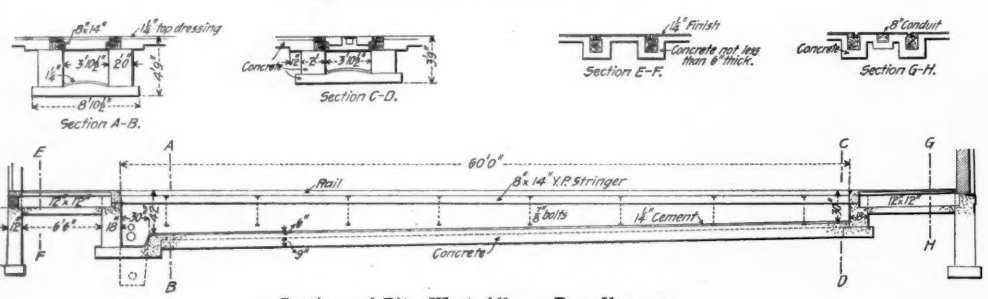
West Albany Roundhouses.



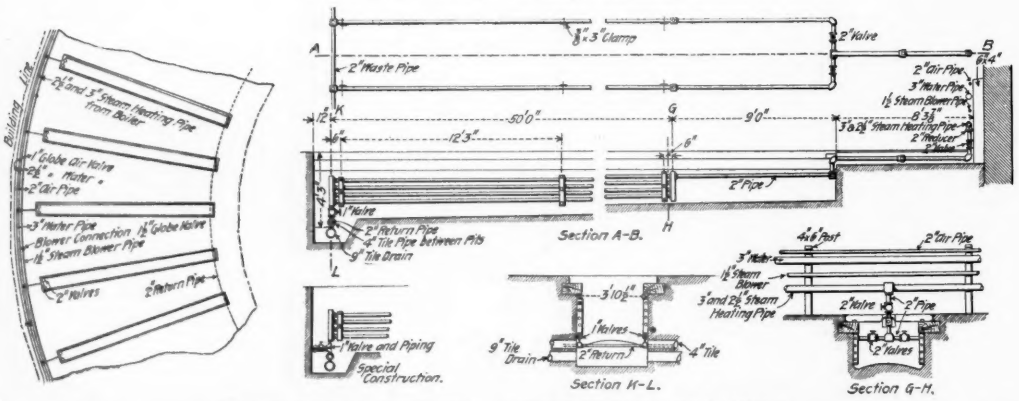
Cross Section of West Albany Roundhouses.



Drop Pits at West Albany Roundhouses.



Sections of Pit—West Albany Roundhouses.



Arrangement of Steam Piping—Roundhouses at West Albany.

New York Central Improvements at West Albany.

General plans and detail designs are made for new yards, roundhouses and accessories, a coal stocking plant and a coal trestle on the New York Central & Hudson River Railroad at West Albany. The illustrations give a general idea of the scope of the work and show details. The contract for roundhouses has been given to Mr. W. J. Gillett, Syracuse, N. Y., and it is intended that the buildings shall be complete by midsummer. The yard work will begin soon and will be carried far toward completion next summer.

The main body of the yards will have 21 tracks; the coal storage yard 21 tracks; the lower part of the yard, to be used for transfer work, will have 13 tracks, and there will be separate tracks for inbound and for outbound engines of the Eastern Division, for inbound engines of the Middle Division, and a track to the stores and shops skirting the roundhouses, as shown in the general plan of the yards.

Two tracks having a double cross-over are also shown leading into the circle of the coal stocking plant. This coal plant will be like the Dewitt plant, described and illustrated in the *Railroad Gazette* of March 8, and will take care of approximately 50,000 tons of run-of-mine soft coal, the calculation being to store 25,000 tons at either side of the two entry tracks. The coal storage yard near by will hold about 400 cars.

The coaling trestle will be double-track and will have 25 double coal pockets delivering from both sides of the structure, thus giving service equivalent to that of 50 single pockets. These pockets and the double sand pockets, of which there are two shown in detail, and the general plan and elevation of the coaling station are given with sectional views of the structure.

The present roundhouse is near the locomotive shops and has 38 available stalls. The turntable is light and the house not suitable for modern engines. Tender work and light repairs on the older locomotives will be done there until the house is finally taken down. The old engine house shown near the transfer yard is a frame building used for storing engines.

All passenger engines are housed at Rensselaer, in a 45-stall roundhouse of the Boston & Albany, and the two new houses will be for freight engines. The Boston & Albany freight engines, and also those of the Hudson Division of the New York Central, will be housed in the Eastern Division house and other freight engines will be cared for in the house marked "Middle Division." About 200 engines will be handled daily. Each house will have 30 stalls and a 70-ft. turntable that will be operated by a gasoline engine or an electric motor.

The plan of roundhouses (giving particular attention to the piping) shows the relative position of offices, repair shops, storehouse and boiler room. Careful consideration has been given to heating, lighting and sanitation. Eventually, the lighting will probably be from an electric power plant which is to be built near the West Albany shops and will cost approximately $90,000. The shops are also to be remodelled and the new electric plant will furnish light and power for the shops and yards. The plant will have approximately 1,500 h.p. at first, with provision made for 500 h.p. additional. The new shop plans are now under way and it is intended to complete the work within the year.

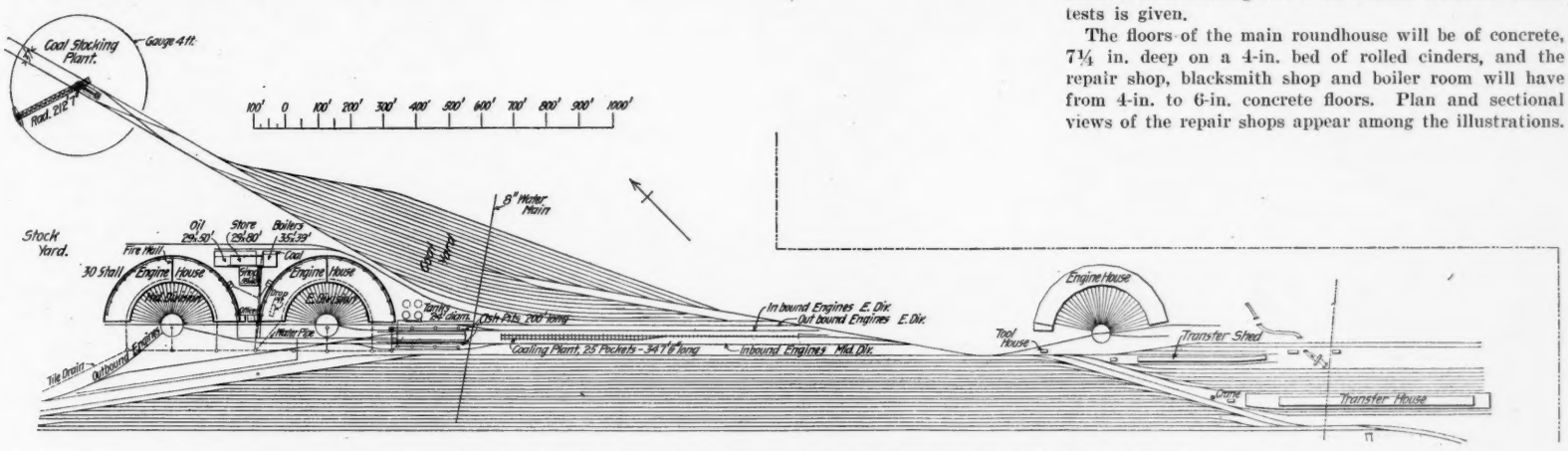
The roundhouses will be New York Central standard, modified in minor details to suit local conditions. The main foundations will be Portland cement concrete, 1:4 and 7½. The parapet or outer walls of the houses will be brick, with stone coping at the ends of the parapet walls and vitrified tile coping on the intermediate portions; all coping to be set in Portland cement, 1 and 1. The inner or door circle will be wood. A cross-sectional

N. Y. C. & H. R. R. Standard Cement Tests.

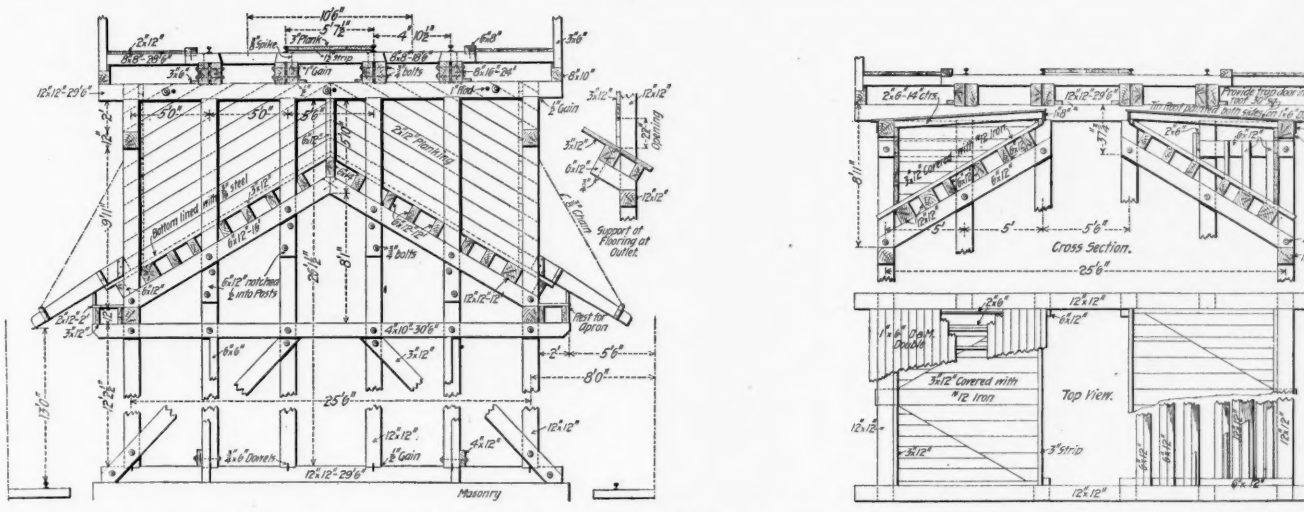
TESTS.	NATURAL ROCK.	PORTLAND.
Sieve No. 50 of 2,500 meshes per sq. in. of No. 35 Stubb's wire gage	95% "fine."	97% "fine."
No. 100 of 10,000 meshes per sq. in.	80% "fine."	90% "fine."
Light Wire Cement to bear ½ in. diameter wire, weight 4-oz. without imprint, in not less than	25 minutes.	25 minutes.
Heavy Wire Cement to bear ¾ in. diameter wire, weight 1 lb. without imprint, in not less than	50 minutes.	50 minutes.
Checking, Cracking and Hot Tests.—Flat cakes or "pats" of stiff plastic neat cement paste, two to three in. diameter by half in. thickness, with thin edges, to be immersed in water not less than two days.	Must not crack nor become contorted along the egdes.	Shall withstand, without cracking, a temperature of steam or water of 212 deg. F. after 24 hours set in cold water.
Tensile Strength.—Standard Briquettes of one sq. in. of breaking sections. Stress applied at a uniform rate, from zero, of about 400 lbs. per one minute.		
Neat—		
1 hour in air, 23 hours in water	65 lbs.	125 lbs.
24 hours in air, 6 days in water	120 lbs.	350 lbs.
24 hours in air, 13 days in water	150 lbs.	408 lbs.
24 hours in air, 20 days in water	175 lbs.	466 lbs.
24 hours in air, 27 days in water	185 lbs.	525 lbs.
Average	139 lbs.	375 lbs.
Standard Sand—	1 to 2.	1 to 3.
1 hour in air, 23 hours in water	30 lbs.	60 lbs.
24 hours in air, 6 days in water	50 lbs.	125 lbs.
24 hours in air, 13 days in water	75 lbs.	160 lbs.
24 hours in air, 20 days in water	90 lbs.	180 lbs.
24 hours in air, 27 days in water	100 lbs.	200 lbs.
Average	69 lbs.	145 lbs.
Weight—		
One barrel shall contain of neat cement, not less than	Natural Rock. 300 lbs.	Portland. 386 lbs.

view shows the timbering and other details. The water-table and pier caps will be concrete, of the same composition as that of the main foundations. The walls of the turntable pit, engine pits and boiler foundations will be concrete, 1:4 and 7½, faced with Portland cement dressing not less than 1 in. thick and in the proportion of 1 to 1½, cement and sand. This facing will be used on all concrete that is exposed to the weather. The concrete center piers of the turntables will be made of a 1:3 and 6 mass. A table showing New York Central standard cement tests is given.

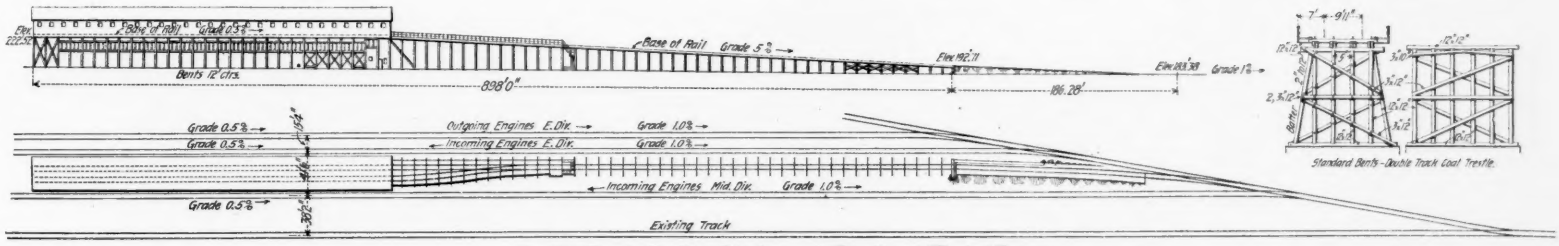
The floors of the main roundhouse will be of concrete, 7¼ in. deep on a 4-in. bed of rolled cinders, and the repair shop, blacksmith shop and boiler room will have from 4-in. to 6-in. concrete floors. Plan and sectional views of the repair shops appear among the illustrations.



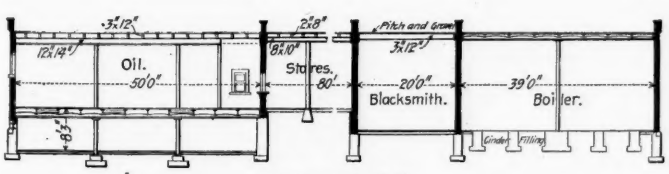
General Plan of New Yards, Roundhouses and Coal Stocking Plant at West Albany.



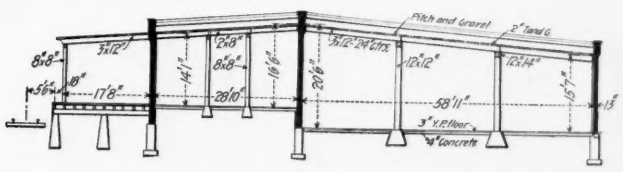
Coal and Sand Pockets—West Albany Roundhouses.



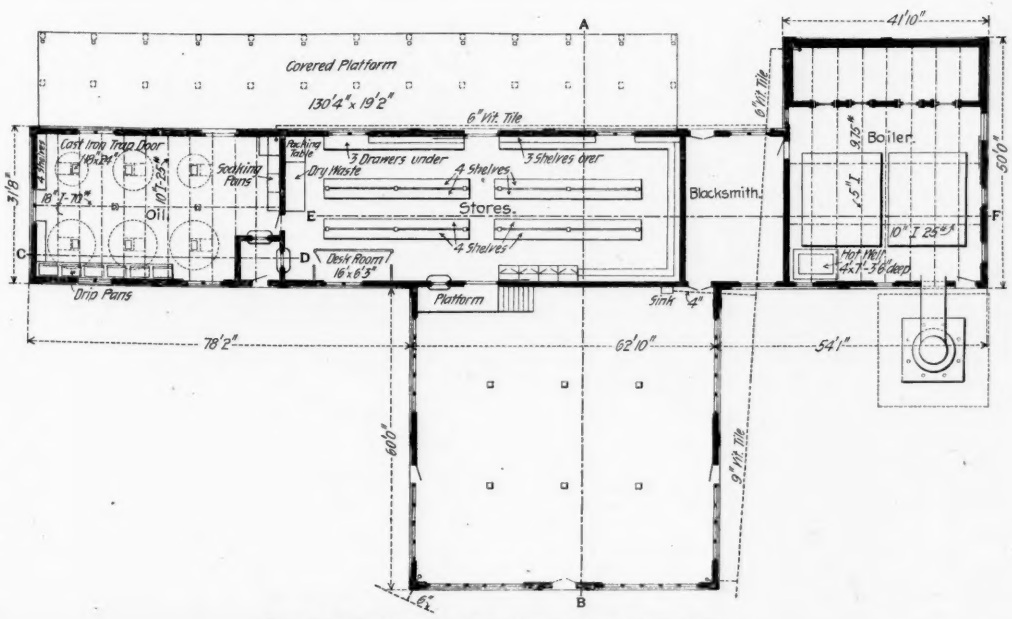
Double-Track Coaling Station and Trestle at West Albany.



Section C-D-E-F.



Section A-B.



Plan and Sections of West Albany Roundhouse Shops.

The concrete work of the engine pits and drop pits is fully illustrated. Steam heat will be used, all pipes being in the pits, except the steam mains. Details of this work are shown in the illustration of steam piping arrangements. There will be pneumatic jacks in the drop pits, the provision for which is illustrated in the sectional views of drop pits.

The boiler plant, which will supply steam only for the repair shop work and for heating will have four 125-h.p. water tube boilers in batteries of two boilers each. There will be a self-supporting unlined steel stack 135 ft. high above the cast-iron base plate, the greatest inside diam. to be 9 ft. at the flare of the base. The foundation will have six courses of concrete, the bottom course to be 22 ft. 6 in. square, the top course 12 ft. 6 in. square, and the total depth of base 12 ft. 6 in. The top course will be concrete in the proportion of 1:3 and 6, all other courses to be 1:4 and 7½. A 1-in. x 1-in. copper rod attached to the base plate and grounding in old rails buried a safe distance from the base will be used to conduct lightning to earth. Beginning with the base course of the stack there is first 30 ft. of ½ in. steel; 10 ft. 7-16 in.; 20 ft. ⅜ in.; 20 ft. 5-16 in.; 20 ft. ¼ in.; 20 ft. 3-16 in.; and a top course of 15 ft. is made up of 3-16 in. steel with a No. 19 B. & S. gage sheet copper cap.

We are indebted to Mr. W. J. Wilgus, Chief Engineer, and his assistants, Mr. E. B. Katté and Mr. W. F. Jordan, for the drawings and information from which this description is given.

Tests of Wide and Narrow Fire-Box Locomotives.

Service tests were recently made of a wide and a narrow fire-box freight locomotive on a road running out of Chicago which are of special interest in view of the large number of wide fire-box engines now building to burn bituminous coal. These were evaporation tests to determine the efficiency of the boilers, and in addition analyses of the smoke-box gases were made to study the two fire-boxes as combustion machines. The analyses were made by Mr. A. Bement, of Chicago. The wide fire-box engine, referred to as A in the following list of dimensions, has three pairs of coupled drivers and a pair of leading and a pair of trailing wheels, the fire-box being deep and extending out over the rear wheels. This engine was completed in June, 1900, and up to December of that year made 28,245 miles. The mogul engine, B of the table, was turned out in March, 1890, and up to December made 39,513 miles. The engines were tested in December. The following are the principal dimensions of these locomotives:

Engine	A.	B.
Grate, width	6 ft.	3 ft. 4 in.
Grate, length	7 ft.	9 ft.
Grate, area	42 sq. ft.	30 sq. ft.
Volume of fire-box above grate	160 cu. ft.	151 cu. ft.
Heating surface of fire box	130.6 sq. ft.	146.2 sq. ft.
Tubes, number	194	289
Tubes, diameter	2¼ in.	2 in.
Tubes, length	16 ft. 1 in.	12 ft. 6⅞ in.
Volume of tubes	68.1 cu. ft.	60.7 cu. ft.
Heating surface of tubes	1,826.7 sq. ft.	1,901.6 sq. ft.
Boiler pressure, nominal	200 lbs.	200 lbs.
Cylinders	19 x 24 in.	19 x 26 in.
Driving wheels	64 in.	64 in.
Exhaust nozzle, diameter	5⅛ in.	4⅞ in.
Distance between deflector and bottom of arch	17 in.	17¼ in.

Boiler Tests.

Analyses of front end gases were made on all of 11 trips. Evaporation tests were made on the first eight trips only, four with each engine, all of the latter runs being over the same piece of track. The last three trips were longer than the others. The evaporation tests consisted of determining the amounts of coal and water used and noting the steam pressure and feed water temperatures. The same engineer and fireman were used throughout. The results of these eight boiler tests are given in Table I.

Water.—The amount of water used was determined by means of a 3-in. Crown water meter. The water was all passed through the right-hand injector, the left-hand injector not being used during the test. Previous to use, a test of the meter was made, and its readings were found to be 1.4 per cent. high, which correction was applied to the observed readings. The first reading of the meter in any test was taken when they started to use the weighed coal, and the final reading was made at the end of the trip corresponding to the time when they were through using coal. Care was taken that the water level in the boiler and the steam pressure were the same at the end as at the beginning of the trip.

The temperature of the feed water was noted every five minutes while the injector was being used. For this purpose an angle thermometer was inserted into the end of the tank just above the water outlet. The thermometer previous to use was compared with a standard thermometer, and found to be practically correct.

Steam.—The steam pressures were noted every five minutes while the engine was running by means of a steam gage that had previously been tested with a dead-weight gage tester and found to be correct. The quality of the steam was determined by a Carpenter throttling calorimeter, tapped into the dome opposite the steam throttle. These determinations indicated that the steam contained on an average about 1½ per cent. of moisture. In the calculations 1½ per cent. was taken as the amount of moisture in the steam as it entered the dry pipe.

Determinations were also made of the drafts in the front end and fire-box, and also the temperatures in the front end. On trips 1 to 8 it was tried to get the temperatures in the front end with a metallic pyrometer. But it was found to take from 10 to 15 minutes for the temperature to equalize throughout the instrument; further, any variation in temperature started the dial of the instrument to change in the direction opposite to the actual change in the temperature, and this continued until the instrument became equalized. For these reasons the metallic pyrometer was unsatisfactory for the work, and a mercury flue gas thermometer from Schaeffer & Budenberg was used on trips 9, 10 and 11.

Results.—Table I. shows the results of the eight evaporation tests. Somewhat heavier trains were hauled with engine B than with engine A. The time on the road was generally satisfactory. Under the head of water, the table shows the average temperatures and the total amount used. The amount that leaked at the blow off valve was determined by trial while the engine was standing for half an hour, and then it was calculated what the leak was for the trip. The water that was lost at the injector was caught in a large tank on the running board and measured in that way. The amount that leaked at the left boiler check was determined for a period of 10 minutes, and then estimated for the trip. In making calculations of the heat absorbed by the boiler everything was reduced to British thermal units. The water evaporated into steam was figured as being heated from the average temperature of the feed water for the trip and evaporated at the average steam pressure for the trip. The water which leaked at the left boiler check, that which went over with the steam and that which leaked at the blow-off valve, was all figured as being heated from the average temperature of the feed water to the temperature corresponding to the average steam pressure. The water lost by the injector was figured as being heated from the temperature of the feed water to 125 deg. Fh. From the total B. T. U's the equivalent pounds of water evaporated from and at 212 deg. was found by dividing by 966, this being the latent heat of evaporation at 212 deg. Under the head of grate area, an allowance was made for the dead plate in engine A. The grate is 6 ft. wide by 7 ft. long, making 42 sq. ft., but 3½ sq. ft. was taken as the area of the dead plate.

Referring now to the water evaporated per pound of coal, the averages of trips 1 to 4 inclusive for engine A and 5 to 8 inclusive for engine B are 7.22 lbs. of water for A and 6.48 lbs. for engine B. That is on an average the wide fire-box engine evaporated about ¾ lbs. of water more per pound of coal than the narrow fire-box engine. However, engine B was worked somewhat harder, so that the actual difference under precisely the same conditions is probably not as great as this.

After having made these evaporation tests, shown in Table I., it seemed very desirable to make one or two longer runs with each engine, making gas analyses and paying special attention to the front end temperatures and drafts in the front end and fire-box. The latter trips were 156 miles long. The gas analyses up to this time indicated that more air was being supplied through the grates than was necessary, so previous to making trips 9, 10 and 11 the exhaust nozzles of both engines were bored out ⅛ in., making the exhaust tip 5¼ in. in engine A and 5 in engine B. On trip 10 with engine B and trip 11 with engine A the idea was to make as good a run as possible and give special attention to the fire and the grates. On these trips the Engineer of Tests personally directed the firing, using blue glass with which to look at the fire, and he also personally shook the grates about every 10 minutes. The gas analyses had indicated that this would be necessary in order to get a proper mixture of air and the gases so as to get complete combustion and burn all the carbon to CO_2, with no CO. Both these trips were very successful. With engine B, as shown by the report of Mr. Bement, practically all the analyses had shown the presence of CO, showing incomplete combustion, although there had been sufficient air. By the special attention which was given engine B on trip No. 10, no CO was found in any of the analyses, and there was a very liberal steam pressure during the whole trip. The fire, too, was in a most excellent condition at the end of the trip. Engine A in trips 1 to 4, inclusive, had shown that with ordinary care complete combustion was readily secured, but more air had got through the grates than was necessary.

The front end temperatures in both engines ranged between 650 and 1,050 deg. Fh., ranging ordinarily between 800 and 900 deg. The front end draft was from 3 to 7 in. in both engines. The fire-box draft of engine B was from 1½ to 2¼ in. and in engine A from 1¼ to 1⅝ in. In each trip eight or ten simultaneous readings were taken of the front end and fire-box drafts. With engine B, the fire-box draft averaged 38 per cent. of the front end draft. With engine A, the fire-box draft averaged 25 per cent. of the front end draft.

Conclusions from Boiler Tests.—As regards the relative merits of the A and B engines the conclusions would seem to be that with the best of care both engines are capable of producing perfect combustion with only a small excess of air. Then there would probably be not much difference in the amount of water evaporated for a pound of coal, although the difference would probably be in favor of the engine with wider grates. However, with the care in firing which is ordinarily given on the road, the fire-box of engine A gives more satisfactory combustion. The reason for this seems to be that the A engine, having larger grate surface, permits of a milder draft in the fire-box with less tendency for local currents to get into the flues without proper mixture.

The tests showed up very strongly the importance of keeping the grates very well shaken; say, every 10 minutes. It would seem that if this matter of grate shaking were followed up and the grates were thus kept free and open all over, in turn permitting of complete combustion in the fire-box, that the coal-burning capacity of the engine could be very largely increased. The exhaust tips could be enlarged, probably ¼ in. in diameter in the B engines and ⅛ in. in the A engines over prevailing practice. This would result in economy by having less back pressure, thus calling for the use of less steam, and by having less excess of air to heat from the temperature of the atmosphere up to 800 or 900 deg. It would also mean much freer steaming engines with less coal consumption. The tests have shown that under the best care given the fire and grates, the steam-making capacity of the boiler, or the horse-power, is limited as much by the physical abilities of the fireman, according to his present duties, as by the boiler itself. What is meant is that to obtain the maximum power out of the boiler when the speed is high and the cut-off somewhat long, the fireman must have the coal furnished him in the condition to shovel it, and can do practically no cracking whatever; otherwise the steam will drop on account of insufficient and uneven supply of coal.

TABLE I.—RESULTS OF EVAPORATION TESTS WITH NARROW AND WIDE FIRE-BOX BOILERS.

(Locomotive A has a wide fire-box; locomotive B a narrow fire-box.)

Test number	1	2	3	4	5	6	7	8
Engine	A	A	A	A	B	B	B	B
Date, 1900	12-13	12-14	12-15	12-16	12-19	12-20	12-21	12-22
Tons in train	1,322	1,434	1,357	1,406 1,419	1,548	1,686	1,528	1,642
Number of cars	36	48	36	42 44	46	48	49	51
Length of run, miles	76	76	76	76	76	76	76	76
Time, total Hrs., mins.	6-41	5-54	4-26	5-8	5-11	4-45	6-0	4-48
Time, running Hrs., mins.	5-4	4-51	3-31	3-51	4-27	3-50	4-53	4-4
Number of stops	6	5	2	4	3	3	3	4
Weather	Clear	Cloudy	Cloudy	Cloudy	Clear	Clear	Clear & Cloudy	Clear & Cloudy
Temperature Deg. Fh.	25 to 35	24 to 30	28 to 29	29 to 34	34 to 45	29 to 44	38 to 48	39 to 48
Average steam pressure Lbs.	173	178	179	182	183	183	192	184
Maximum steam pressure Lbs.	185	190	190	190	195	195	200	195
Minimum steam pressure Lbs.	150	140	160	160	170	130	185	175
Water, average temperature Deg. Fh.	45	50	58	57	41	45	44	44
Water, maximum temperature Deg. Fh.	48	51	61	60	44	47	46	44
Water, minimum temperature Deg. Fh.	40	43	45	47	39	44	39	43
Water passing meter, corrected readings Cu. ft.	1,312	1.016	997	1,106	1,312	1,120	1,538	1,209
Water used (meter) Lbs.	81,895	63,390	62,195	68,970	81,870	69,929	96,027	75,472
Water evaporated into steam Lbs.	79,745	61,640	60,815	67,420	80,055	68,234	93,966	73,754
Water leaked at left boiler check Lbs.	505	450	340	375	175	170	210	175
Water passed over with steam, 1.5 % Lbs.	1,215	940	925	1,025	1,220	1,040	1,431	1,123
Water from injector overflow Lbs.	330	270	115	150	420	485	420	420
Water leaked at blow-off valve Lbs.	100	90	....	....	....	....	....	....
Equivalent evaporation from and at 212 deg. Fh. Lbs.	98,224	75,690	74,067	82,625	98,954	84,049	115,948	90,923
Coal used Lbs.	13,900	11,240	10,420	10,380	15,300	12,430	16,340	16,240
Combustible used Lbs.	11,440	9,250	8.576	8,543	12,510	10,230	13,440	13,350
Water used per pound of coal Lbs.	5.89	5.64	5.97	6.65	5.35	5.62	5.88	4.65
Water used per pound of combustible Lbs.	7.16	6.85	7.25	8.09	6.5	6.83	7.14	5.66
Water evap. from and at 212 deg. Fh. per lb. of coal Lbs.	7.07	6 73	7.11	7.96	6.47	6 76	7.10	5.6
Water evap. from and at 212 deg. Fh. per lb. of combus. Lbs.	8.59	8.18	8.64	9.68	7.86	8.22	8.63	6.81
Coal burned per ft. heating surface per hour (running) Lbs.	1.40	1.19	1.52	1.38	1.68	1.56	1.63	1.95
Equiv. evap. per ft. of heat. surface per hour (running) Lbs.	9.92	7.98	10.75	11.0	10.85	10.71	11.59	10.9
Grate area, net Sq. ft.	38.5	38.5	38.5	38.5	30.	30.	30.	30.
Coal burned per foot of grate per hour (running) Lbs.	71.2	60.3	77.1	70.	114.6	108.1	111.5	133.
Diameter exhaust tip In.	5⅛	5⅛	5⅛	5⅛	4⅞	4⅞	4⅞	4⅞

The following are extracts from the report of the Engineer of Tests covering this part of the work:

Coal.—The amount of coal was determined by removing all coal from the tender, weighing on track scales, then putting the desired amount of coal in the coal pit and reweighing. The coal left at the end of the trip was determined by weighing the tender on track scales, shoveling off the coal left and reweighing, the difference between the amount of coal supplied and the amount of coal left was the amount used on the trip. The amount of coal used does not include what was necessary to fire up and to take the engine to the train. The coal necessary for these purposes was placed on the tender deck in bags, the weighed coal being boarded in so it could not be used until the start was made with the train. All the coal used was Illinois coal. A car of coal for these tests was set out at either end of the run and two samples from each car were analyzed, and the averages for each car are as follows:

	First Car.	Second Car.
Moisture	4.1	6.0
Volatile matter	38.6	38.1
Fixed carbon	44.1	43.8
Ash	13.2	12.1

These analyses indicate that all the coal was of about the same quality, and capable, if all the heat were utilized, of evaporating about 13 lbs. of water from and at 212 deg. Fh. per pound of coal.

Analyses of Smoke-Box Gases.

The following extracts, concerning the analyses of smoke-box gases, are taken from Mr. Bement's report:

The scheme followed in this analytical work was to ascertain the relative performance of the two engines with the usual method of handling, but it is reasonable to assume that the fireman's work was above the average, as is usually the case in experimental work. When this relation had been ascertained the practice was improved until it ended in the excellent performance shown

by trips Nos. 10 and 11, where a better combustion was secured with less air and with a high steam pressure and greater horse-power.

The different gas samples were uniformly gathered over a period of about ten minutes, and the time of sampling was selected to show regular working conditions. The averages for the different trips are as follows:

Trip.	Engine.	% CO_2.	% O.	%CO.
No. 1	A	11.70	6.20	0.50
No. 2	A	10.80	5.84	0.25
No. 3	A	12.45	5.45	0.15
No. 4	A	10.90	6.80	0.00
No. 5	B	11.70	4.50	2.33
No. 6	B	14.00	3.74	1.10
No. 7	B	12.56	4.14	0.72
No. 8	B	12.80	3.90	1.26
No. 9	B	12.53	3.90	1.72
No. 10	B	12.43	6.03	0.00
No. 11	A	13.10	5.96	0.05

The performance by series is as follows:

Trip Nos.	Engine.	Exhaust nozzle.	% CO_2.	%O.	%CO.
1 to 4	A	5⅛ in.	11.47	6.07	0.22
5 to 8	B	4⅞ in.	12.76	4.07	1.35
10	B	5 in.	12.43	6.03	0.00
11	A	5¼ in.	13.10	5.96	0.05

To illustrate the relative performance of the two engines, two comparisons are made, the first based on the first trip of each, and the second on the last trip of each, these trips being shown in the following group:

Trip.	Engine.	Grate surface.	Max. draft.	Nozzle.	Front end temp.	% CO_2.	% O.	%CO.
No. 1	A	40	2.25 in.	5⅛ in.		11.70	6.20	0.50
No. 5	B	30	3.25 in.	4⅞ in.		11.70	4.50	2.33
No. 10	B	30	2.25 in.	5 in.	850° Fh.	12.43	6.03	0.00
No. 11	A	40	1.62 in.	5¼ in.	850° Fh.	13.10	5.96	0.00

There is a dead bar in the grate of engine A which reduces the grate opening to 38½ sq. ft., but as coal burns on the entire surface, I have given the surface a value of 40 sq. ft. The drafts are those at the fire taken with the doors closed. In making the comparison, complete combustion is assumed on trip No. 11, which is due to the engine, because the small amount of CO in one sample should not be charged against the engine. Between the showings of each engine on its first trip, there is a decided difference in favor of engine A as against B, and if the character of the firing which prevailed is taken as a standard quality, then the superiority lies with A, or the engine with wide grates. But if what the engine will do when handled for best results is taken as the standard of comparison, then the difference is very small indeed. The difference in boiler efficiency owing to smaller air supply of engine A on trip No. 11 over engine B on trip No. 10 is approximately 1 per cent. Owing, however, to the larger nozzle and smaller cylinders of engine A there would be lower back pressure, which would be in its favor.

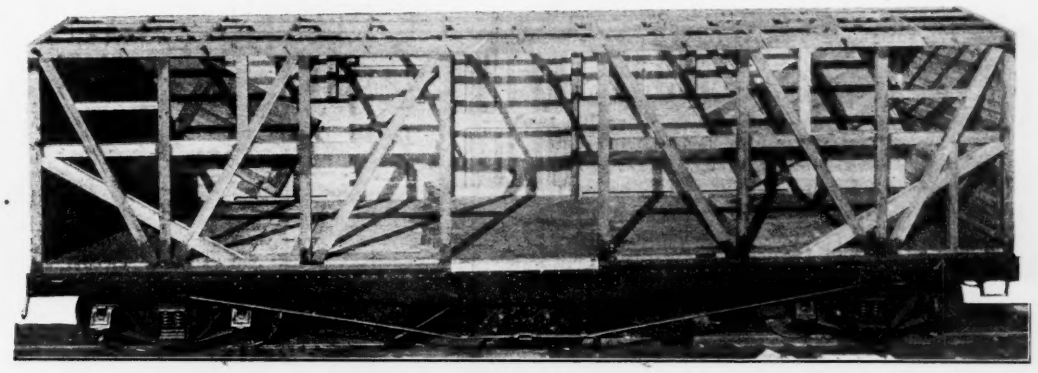
While engine A showed 13.1 per cent. of CO_2 as against engine B with 12.43 per cent., if a little more coal had been supplied it would have showed as high an analysis, and the two engines would have been on a par as far as boiler performance is concerned. Even the longer runs were not long enough to afford an opportunity of ascertaining the relative possibilities of the large grate as against the smaller one; in fact, upon arrival at destination on both trips Nos. 10 and 11 the fires were apparently in as good condition as at the start. It is considered that either engine could have been turned around and immediately made the return trip without any preparation whatever. While both engines on trips Nos. 10 and 11 made considerably more horse-power than on any of the previous trips, there was no time whatever that their boilers were worked to their capacity.

The one important thing which insured such performance as trips 10 and 11, was that of shaking the grates at regular intervals, and, in addition, careful firing. The result was that with less draft more horse-power was secured with complete combustion, and as high steam pressure as desired could be maintained at any time. Under the direction of the Engineer of Tests, the fireman's practice was improved from the start, until the last two trips, when the grate was shaken at ten-minute intervals. He also used a method of observing the condition of the fire which was of material assistance, that of using colored glass through which to inspect the fire.

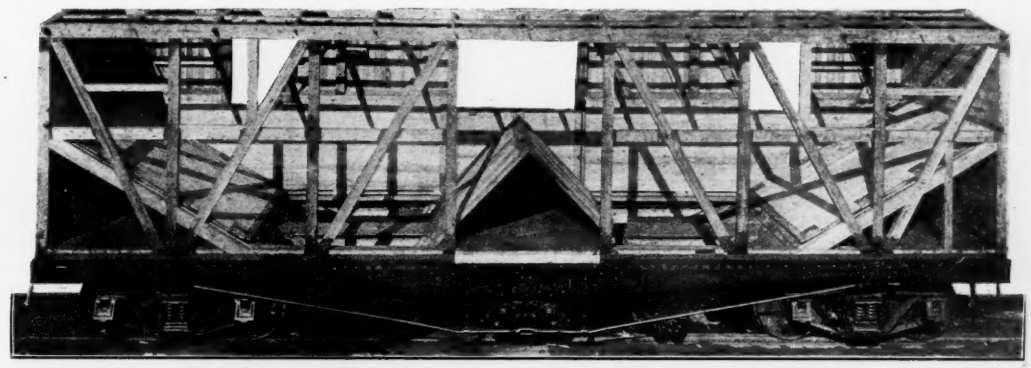
The first thing of importance in working furnaces is the maintenance of a clean fire. First, that a dirty fire causes incomplete combustion, and second, that it reduces the coal-burning capacity. The next in order is that of uniform and steady coaling. When these have been secured, and not till then, is it time to consider the air supply or draft. I am very much impressed by the horse-power capacity possible when fires are worked as mentioned here; in fact, I consider that either engine under consideration could burn more coal with good combustion than one man could supply. This was well shown once when, owing to several lumps of coal falling down in the way, the fireman was not able to keep up the fire, but was compelled to break the coal that had come down before he could properly replenish the fire. This caused a drop in CO_2, and illustrates the importance of close and careful attention to the fire. I am of the opinion that it would be found a paying investment to employ an assistant to the fireman on your more important heavy passenger runs, where the horse-power requirements are so very large. The matter of getting such trains over the road on time would, in itself, justify the increased cost.

Mr. Manning's Combination Flat and Hopper-Bottom Box Car.

June 22 last, we published the drawings of the combination flat and hopper-bottom box car designed and patented by Mr. W. T. Manning, Consulting Engineer, of Baltimore. While the drawings showed the construction of this car quite clearly, the framing and the arrangement of the doors are better shown in the accompanying engravings made from photographs taken while one of these cars was building. One view shows the arrangement for a flat-bottom car, and the other how, by changing the doors, the hopper bottom is available. The change is very easily made.



Framing of the Manning Convertible Car. Floor That of a Box Car.



Framing of the Manning Convertible Car. Floor That of a Hopper Bottom Car.

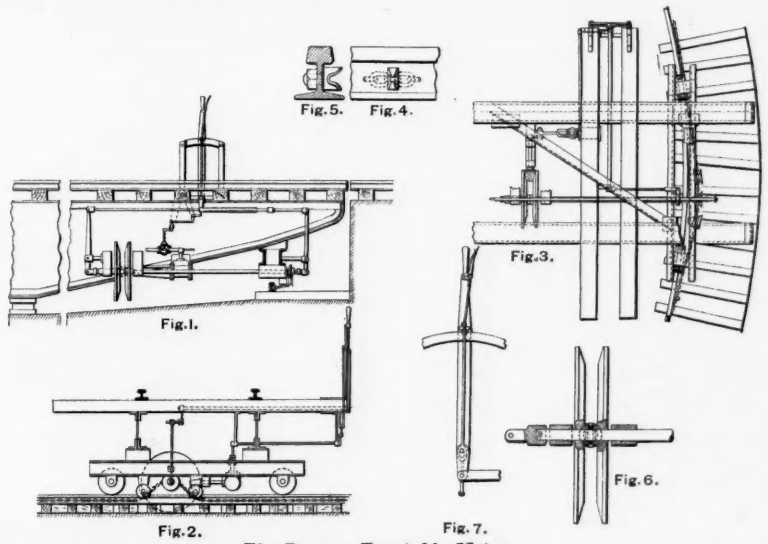
One of these cars built by the Baltimore & Ohio was exhibited at Chicago during the Engineering and Maintenance of Way Association meeting. It has four hoppers, two on either side of the center sills. The underframe is pressed steel, and the superstructure is wood. This car was loaded at Fairmount, W. Va., with 30 tons of coal and taken to Baltimore, where it was dumped in 20 seconds. On March 9 it was loaded with oysters in pails and barrels and sent by U. S. Express to Chicago. From Chicago it was loaded with grain for Baltimore. This gives an idea how the car can be used for a wide range of service, and it is reasonably expected that it will make a very large mileage. There is a further advantage in that the hopper bottom makes it cheaper to unload such materials as coal, and the cost of loading is also reduced, as the car has openings near the ends for loading at tipples.

The Beamer Turn-Table.

For the past two years a turn-table driven by compressed air has been in successful operation at the Tyrone shops of the Pennsylvania Railroad. It was designed and patented by Mr. James A. Beamer, Master Mechanic at Tyrone, who has furnished the drawings and information from which this description is given. A small horizontal engine, having cylinders 3 in. x 4 in. and run at 300 r. p. m., is placed between the girders of the turn-table, as shown in Fig. 1. Compressed air is supplied to this engine through a ¾-in. pipe, which passes up through the center of the turn-table and is connected at the bottom by a swivel joint to the pipe leading to the air supply. There is also a pipe leading to either end of the turn-table, so that the air-brake hose of the engine may be connected and the engine turned by its own main reservoir pressure. An 8-in. Westinghouse pump furnishes the independent air supply for the turn-table engine.

The turning machinery, in addition to the engine, includes a short shaft which is connected by a crank arm to the engine and has on its end a beveled friction piece; two large friction disks some little distance apart and fastened on a shaft, on the end of which is a sprocket wheel; a complete circle of chain around the rail on which the turn-table carriage runs; the necessary structure for attaching the working parts to the turn-table; a pair of guide wheels for the chain, and also a number of lugs bolted to the web of the rail to receive the chain, as shown in the illustrations. Fig. 1 shows a part side elevation of the turn-table thus equipped, Fig. 2 an end view, Fig. 3 a part plan view, and Figs. 4 and 5 show the relation of the rail, chain, and lug. In Fig. 6 the friction device is shown in detail, enlarged, and Fig. 7 shows the reverse lever and its connections.

The sprocket wheel on the end of the transverse shaft is set far enough outside of the circle of the rail to allow the chain to be passed over the sprocket wheel and under the two carrier wheels, drawing the chain free from the lugs in the rail as the carriage passes. After the passage of the carriage the chain settles back naturally into the lugs and it is found that, although the chain is nominally free as a circle about the rail, there is no slip. The grip of the chain on the rail is normally great by mere surface contact, and when to that is added the settling of the chain in the lug, as shown in Fig. 4, all possibility of slip on the circle is removed. In controlling the direction of rotation the transverse shaft is shifted to bring



The Beamer Turntable Motor.

either of the large friction disks in contact with the small engine-driven friction piece, thus determining whether the sprocket shaft shall move in one direction or in the other, and the admission of air to the engine cylinder is controlled by connections of the same lever.

About 100 locomotives a day are turned on this table, the compressed air being used at from 60 to 75 lbs. working pressure. A locomotive can be turned end for end in 45 seconds, or a complete revolution can be made in a minute-and-a-half. No trouble has been experienced with the operation of the chain in the lugs of the rail, as it drops easily into place when released from the sprocket and guide wheels. Before this motor was installed two day-men and two night-men were required at the turntable, whereas now one man for the day and one for the night service is sufficient . No attempt has been made to figure the cost of the compressed air that is used, but from the fact that an 8-in. air pump readily supplies the demand, and that the table is generally used less than a minute at a time, this item must be small as compared with the saving of labor.

The New Mechanical Engineering Shops of the University of Minnesota.

Sixteen years ago, when the present Mechanic Arts Building of the University of Minnesota was erected, not only was the entire work of the engineering department carried on in this building, but it also contained the department of physics. Since that time many changes have occurred. Numerous additions have been made to the original building. The attic has been finished off for drawing rooms, the engineering laboratory has been extended, and an annex containing forge shops and foundry has been built. Yet with all these enlargements, it has been apparent for some time that the present quarters are totally inadequate for the needs of the College. To meet these conditions, and the more closely unify the interests of the department of mechanical and electrical engineering, a new engineering building has been planned which, when completed, will contain the various shops and laboratories of both departments as well as lecture, recitation and drawing rooms for the work of the junior and senior years. The building as planned consists of a main front connected to two wings, one of which will contain the mechanical and electrical laboratories, the other the shops. In order to give present relief to the overcrowded mechanic arts building, the last Legislature appropriated a sum of money wherewith to erect the shop wing of the engineering building, and this has recently been finished.

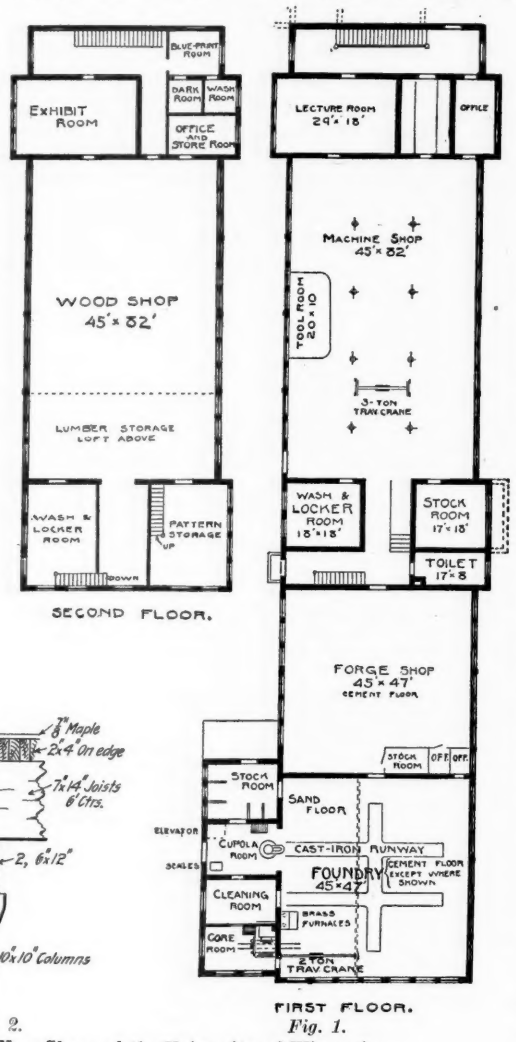


Fig. 1.

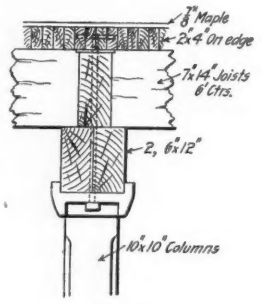


Fig. 2.

New Shops of the University of Wisconsin.

The building is generally used less than a minute at a time, this item must be small as compared with the saving of labor.

This wing, the floor plan of which is shown in Fig. 1, consists of a two-story portion containing the machine shop on the first floor and the wood shop on the second. Beyond the machine shop and at a different level is the forge shop and foundry, both one story high. This wing occupies a ground area of 47 x 235 ft., with an 18 x 50 ft. addition to the foundry. These shops have many of the best features of modern commercial work shops, and it is believed that they have a certain educational value in this respect. Slow-burning mill construction is used throughout. This consists of brick walls and heavy timbers, which, in case of fire, burn slowly, and are safer than the ordinary iron and timber combination for this class of buildings. An interesting feature is the construction of the floors, shown in Fig. 2. This floor is practically free from vibration, and gives a very solid foundation for the machinery. In the machine room a 3-ton traveling crane will cover a clear span of 12 ft. throughout the entire length of the shop, thus giving ample space for erecting. This crane also serves some of the larger machine tools. The benches on each side of the shop are of 3-in. maple carried on especially designed cast iron legs, a modification of the Brown & Sharpe style. The blacksmith shop to be fitted up later will contain 20 forges, and will have ample room for the present drop hammer, as well as a powerful hammer to be added subsequently.

In a college shop the foundry usually receives the least attention, and yet there is no part which will repay careful attention to details more than this department. In the present case, the foundry has been the subject of especial study, and possesses many features of interest. In accordance with best modern practice for light work, the floor is to be cemented (except in one section as shown) and the gangways leading from the cupola and extending lengthwise of the room, are to be of heavy iron plates set in cement. Two brass furnaces have been provided, embodying some novel features. There are two core ovens, one for ordinary work 3½ x 3½ x 5 ft., and one 3½ x 7 x 6 ft. for special cores which may be required. The feature of these core ovens is that the gases and products of combustion are caused to traverse suitable conduits under a plate floor, and do not come into direct contact with the cores. A light traveling crane is also provided for the foundry. This has a span of 15 ft., and a run of 47 ft., the entire length of the room.

The lighting, heating and ventilation of the building have received careful consideration. In the machine and pattern shops 60 per cent. of the wall space above the benches is in glass. In the foundry and forge shop less side light is allowed, since an abundant supply of overhead light is obtained from windows placed in a lantern or ventilator which extends the entire length of the roof. Pipe coils are employed in heating the building, and these are placed partly on the side walls under the windows and partly overhead. Electric power is used for driving the machinery. The group system has been selected as best adapted to the conditions, and a number of small motors have been placed in the several departments. Continuous current, 220-volt motors are employed in connection with a three-wire system of distribution, which is also used for the lighting circuit. While these are not as large as many of the college shops of the country, it is believed that in arrangement, convenience and adaptability to the purposes of instruction they are superior to any. Plans have also been made for a $60,000 electric power and lighting station together with an electrical laboratory. We are indebted to Prof. J. J. Flather, the head of the department of mechanical engineering, for drawings and information.

A former manager of the Hungarian State Railroads, Von Lukacs, who, after the death of Baross (who introduced the zone system), was for a time Minister of Commerce, and at the Paris World's Fair was the Hungarian General Commissioner, committed suicide Jan. 7 last.

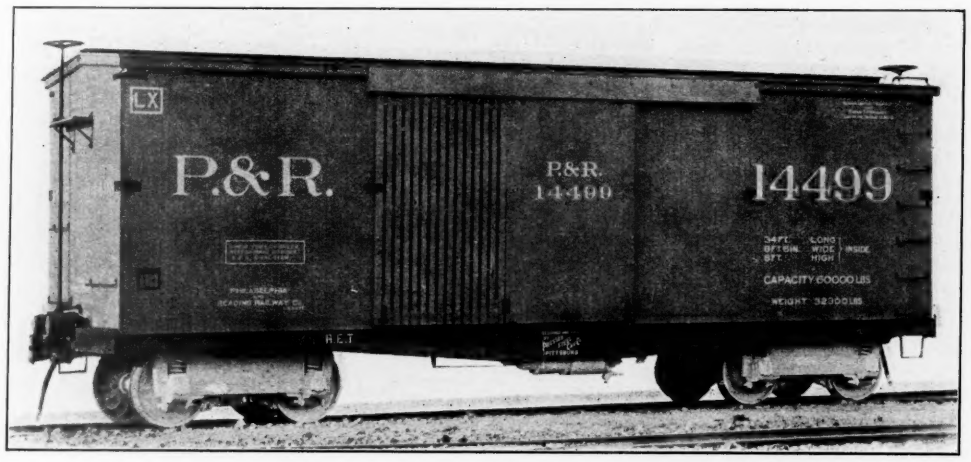
60,000-lb. Capacity Box Car with Pressed Steel Underframe—Philadelphia & Reading Railroad.

The Pressed Steel Car Company recently built a number of 60,000-lb. capacity box cars with pressed steel underframe for the Philadelphia & Reading Railroad. One of the cars is here illustrated from a photograph, and line drawings show the design. The standards of the manufacturers have been followed in the steel underframing, and the trucks are of the Fox pressed steel pedestal type made to conform in detail to the Philadelphia & Reading standard. The draft rigging is between the center sills, and buffing and pulling strains are thus directly taken by the sills while the body bolsters are relieved from these shocks. A comparatively new feature is the standard pressed steel brake-beam with which these cars are equipped, this beam having been successfully used on a large number of cars which the Pressed Steel Car Company has built.

The wheel base of the truck is 5 ft. 2 in., and the distance from center to center of journals across the truck is 6 ft. 3 in. The journals are 4¼ x 8 in., and the wheels are chilled cast iron, of the double-plate pattern, 33 in. diameter and weigh 600 lbs. The height from the rail to the top of the transom with the weight of the light car body on the truck is 28⅝ in. The center plate is pressed steel ½ in. thick, riveted to base plate, the center of which is supported by a pressed steel bracket riveted to the transom. The side bearings are of malleable iron, bolted to the top flange of the side plates, and the chafing surfaces of the side bearings are 2 3-16 in. above the chafing surface of the center plate. The axles are steel, P. & R. standard, the journal boxes are McCord, malleable iron, suitable for the Fox truck, and each box is provided with the Soule rawhide dust guard. The brakes are inside-hung, and Christie brakeheads and shoes are used. Each brake-beam is provided with two safety hangers, secured to the transoms, in addition to the brake hangers.

The length over all is 38 ft. 6¼ in., width over all 10 ft. 2 in., height over all 13 ft. 9 in., and the width at eaves 9 ft. 10 in. The height at eaves is 12 ft. 8¼ in., and the coupled length is 37 ft. 11¾ in. The length over end sills is 35 ft. 11¾ in., and the width over end sills 9 ft. 1 in. The height from rail to the under side of side sill is 2 ft. 8 7-16 in., and the height of the center of the drawbar from the rail is 34½ in. The inside body length is 34 ft. ¼ in., and the width inside 8 ft. 6¼ in. The height of body inside from floor to carline is 8 ft. 2¼ in., the height of the door opening is 7 ft. 9 in., and the width of the door opening 5 ft. From center to center of trucks is 24 ft. 6 in., and the total wheel base is 29 ft. 8 in.

The side sills are pressed steel in channel form 10 in. deep at the ends and 17 in. deep at the center, ¼ in. thick with 3⅞ in. flanges, and extend from end sill to end sill, to which they are riveted through the top, bottom and side flanges. They are further connected with the center sills by the body bolster and a number of transverse diaphragms. The center sills are of the same depth as the side sills, and are likewise of channel form, but are ⅜ in. thick. They terminate at each end of the



Philadelphia & Reading Box Car With Pressed Steel Underframe.

car ½ in. inside of the face of the rear draft lugs, and are securely tied together by top and bottom cover plates between the body bolster and the rear draft lugs; by top and bottom cover plates and center braces constituting the body bolster; and by transverse braces spaced at intervals between the two body bolsters.

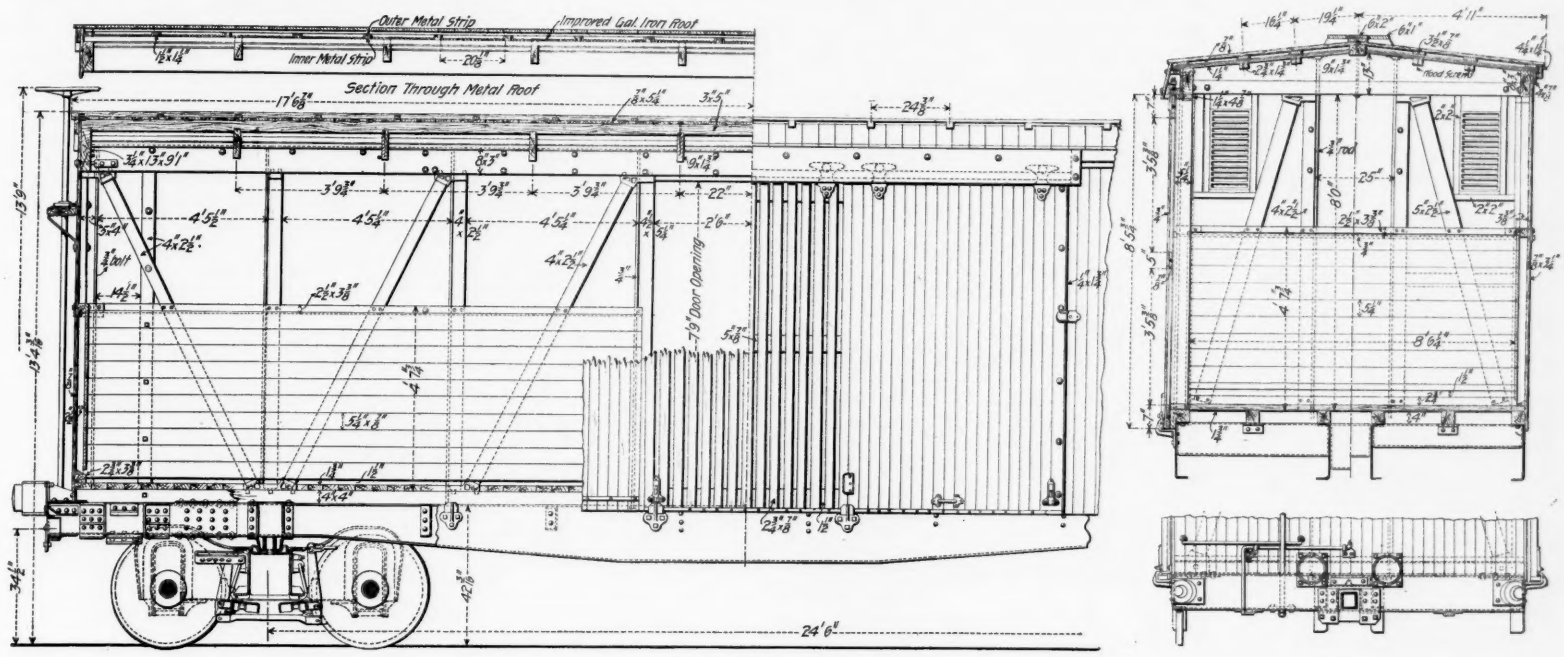
The draft sills are 9¼ in. deep; of ⅜-in. metal, in channel form and have flanges 3⅞ in. high fastened to the center sills and extending to the face of the end sills. They are securely fastened to center and end sills through a ⅜-in. liner on the top flange and to a tie plate between the lower flange and end sill at the bottom. The end sills are ¼ in. thick, formed and flanged for connection with draft sills and side sills. They have an opening 6½ in. wide at the center for the reception of the coupler, and are reinforced in front of the striking horn of the coupler by a bar ¾ in. thick extending over the draft sills. The end sills are further reinforced at this point by pressed steel brackets ⅜ in. thick, flanged

on three sides and riveted through flanges to the end sill and the draft sill. At each corner of the end sill there is a pressed steel corner band which also serves as a push pocket. Each end sill has a 4 in. x 4 in. angle extending the full length of the sill and riveted to the top flange, thus supporting the end framing of the body. Each end sill is further secured to draft sills by two 5-16-in. tie plates between the bottom flange of the end sill and draft sill.

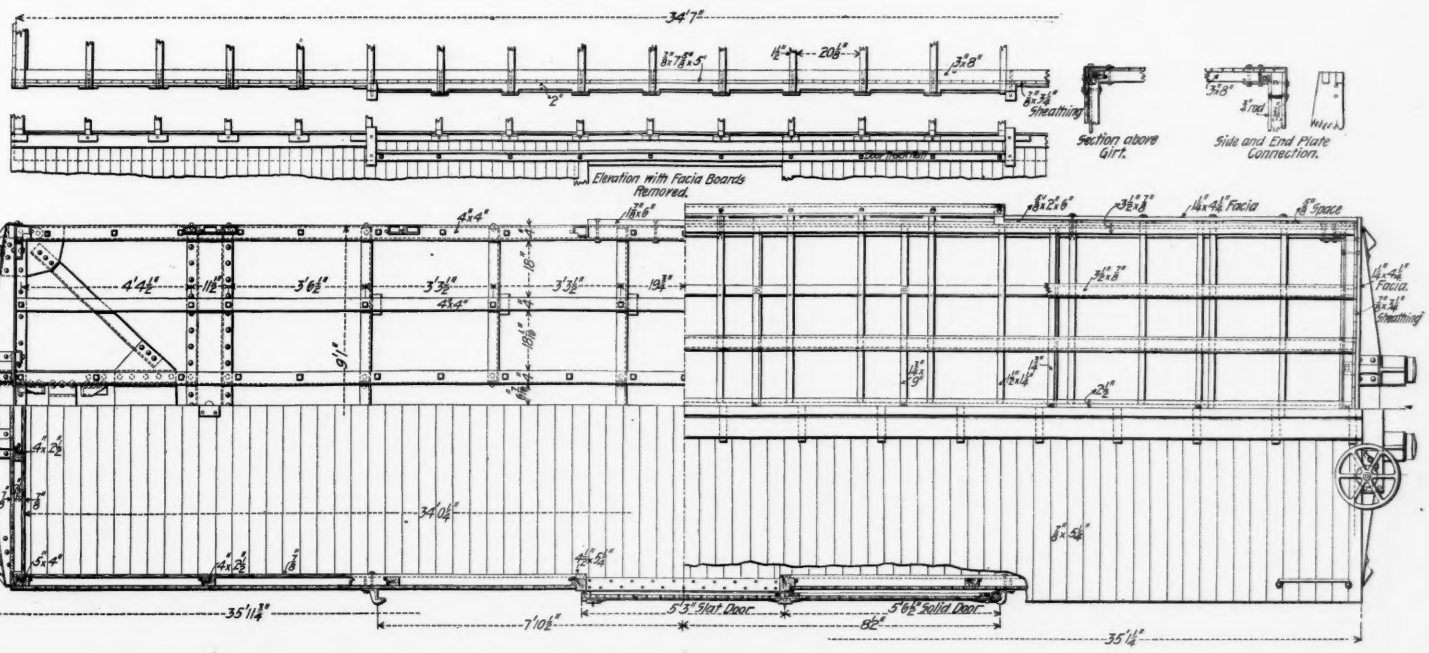
The body bolster is made of two diaphragms of ½-in. steel between the center sills, and two diaphragms of 5-16-in. steel between the center and side sills on each side of the car. These members are riveted together with top and bottom cover plates and body center plates. There are 12 transverse braces per car, six on each side between center and side sills, spaced at intervals between the body bolsters. They are of channel form, and four of them are 10 in. deep and ¼ in. thick with flanges 3 in. high, and eight of them are 7 in. deep, the height of flanges and thickness of metal being the same as for the 10-in. diaphragms. The body center plate is of steel ½ in. thick made to conform to the P. & R. standard truck center plates. The body side bearings are of ½-in. steel, and are spaced ⅜ in. apart when the car is standing level, each side bearing having a chafing face of 3 in.

The draft gear is the Gould coupler yoke with twin draft springs and arranged for attachment to steel underframing. Each car has four Gould spring buffers, as shown in the illustration from a photograph of car No. 14,499. These buffers are secured to the end sill by two ¾-in. bolts, and also to the buffer braces in the same manner. Each end sill has two ⅝-in. steel buffer braces arranged to brace the part of each buffer that extends above the end sill. These braces are fastened to the end sill and end supporting angles by ⅝-in. rivets.

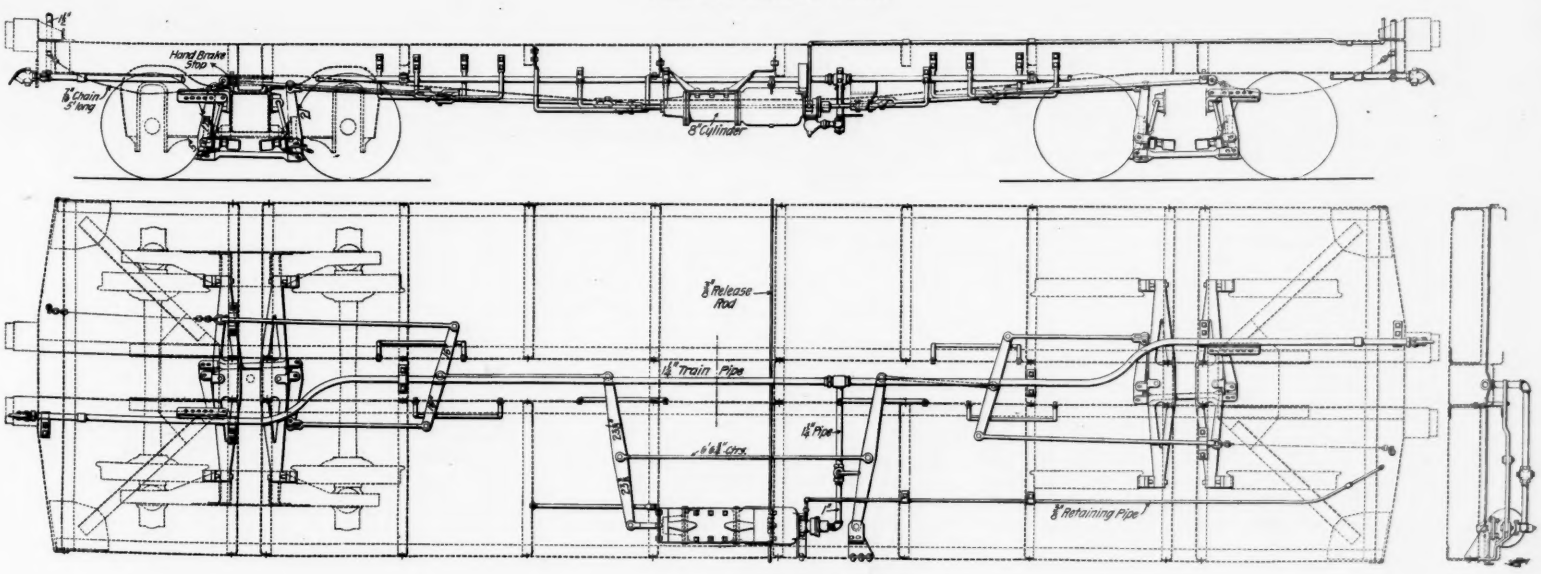
The cars are equipped with the Westinghouse automatic freight air-brake, and the arrangement of all air-brake equipment is shown in plan and elevation in the accompanying illustrations. In addition to the special equipment already mentioned there are Dunham door fixtures, Security door strips and Chicago improved gal-



Elevations and Sections.



Plan and Sectional Views.



Arrangement of Air-Brake.

60,000 lbs. Capacity Box Car With Pressed Steel Underframe—Philadelphia & Reading Railroad.

vanized roof. The card racks are P. & R. standard. While the capacity of these cars is small, as capacities are now rated, to increase the carrying capacity to 80,000 lbs. it would only be necessary to substitute trucks, using 5 in. x 9-in. journals. The light weight of the car would then be increased about 1,000 lbs. over the present weight of 32,300 lbs.

A System of Steel Framing for Freight Cars.*

By G. W. Scott.

The fact of a car being made of steel is not sufficient to warrant indiscriminate conclusions regarding its desirability, its carrying capacity, or its longevity. Something more than merely being made of steel is to be considered if a satisfactory and economically constructed car is what is wanted. It would at least appear advisable that the design of the car shall be made in accordance with the broadest requirements in the case, and with some regard to commercial consideration concerning the material used, and also with some thought of the working stress to which the material is to be subjected. There may be some question as to what constitute the fundamental requirements in car design, but the following notes are submitted as being worth consideration in this respect.

(1) A car designed primarily with regard to the nature of car service in general.

(2) The use of materials which may be obtained as nearly as possible in their finished forms, and throughout the country at large, and preferably independently of any one manufacturer.

(3) The application of such materials in the simplest and most direct manner. This to promote economical construction and to admit of repairs and replacements being made with the least difficulty and expense.

(4) A system of under-framing competent to carry the whole of the dead and applied loads without assistance from any associated upper structure, and no less competent to hold up, structurally unimpaired, under the general conditions of car service.

(5) A system of under-framing in which the greatest possible proportion of the vertically applied loads shall be transmitted in the most direct manner to the center plate without producing a bending moment in the body bolster.

(6) A system of under-framing consisting of members having equal upper and lower flanges, between which the horizontal forces from and through the drawbars may be transmitted.

(7) A system of under-framing having a central rigid connection for the purpose of transmitting direct from drawbar to drawbar the shocks due to impact, in addition to the ordinary stresses consequent on the movement of the car or train.

There are, of course, many other requirements in detail; but it was with such general propositions as these in mind that the under-framing marked (Fig. 1) was designed. In its leading features the underframing consists of a single center sill (A) with its ends abutting against the bolsters (C), the connection with the latter being over the central portion of the center plate. The bolsters (C) are continuous throughout their length, and have their ends framed with the side sills (B), the latter extending the full length of the framing. Draft beams (F) bear directly against the bolsters (C) at the one end, and against the end sills (M) at the other; and the end sills (M) are connected, as shown, to the side sills (B). The system of under-framing so far described is uniform in depth, and thus renders easy the application of the upper and lower covering plates (G and H) at the connection of the bolster (C) with the center sill (A) and draft beams (F). Other covering plates are employed at the connection of the draft beams (F) with the end sills (M). The diagonal braces (K) are intended to add to the stiffness of the framing, and to transmit corner shocks to the rigid connection at the center of the bolster and to the center sill beyond. In the design shown the intention is to use a wooden floor; hence the floor beams (N) to carry suitable floor joists to which the floor may be fastened. These floor beams are also serviceable as lateral stiffeners.

There is reason to believe that the system of underframing described (Fig. 1) complies with the general terms of requirement No. 1, in the foregoing; and with regard to requirement No. 2, it may be stated that the center sill and bolsters are standard "I" beams, and that the side sills, draft beams and end sills are standard "channels." The materials, then, are such as may be readily procured, and their sectional form renders unnecessary any special work being done upon them save that associated with their application. It may further be noticed that the several connections are reasonably simple in character, thus complying with requirement No. 3. Concerning requirement No. 4, it may be stated that one of the advantages of this system of under-framing is in the fact that by the use of standard commercial shapes it is possible to calculate within close limits just what sectional elements are required for a car of any reasonable length and capacity, and with any desired fiber strain or limiting factor of safety, relative to any assumed form of loading. Requirement No. 5 is complied with in the most positive manner. If it is granted that the center sill carries, say, one-half of the total load supported on the area between the bolsters, it is plain that this large proportion of the entire car load is transmitted practically direct to the center plate and, therefore, without producing any bending moment in the body bolsters. The symmetrical character of the commercial "I" beam and channel sections, and their equally symmetrical disposition as indicated in Fig. 1, are in accord with requirement No. 6; and with regard to requirement No. 7, it may be said that while a single center sill may be unusual, reflection will show that it is a correct solution of the problem with regard to the direct transmission of stresses from drawbar to drawbar. It has also been shown that a single center sill has an advantage in transmitting direct to the center plate its share of the vertically applied load; and it will be further recognized that the use of one center sill instead of the customary two is a desirable feature from an economical and constructional aspect.

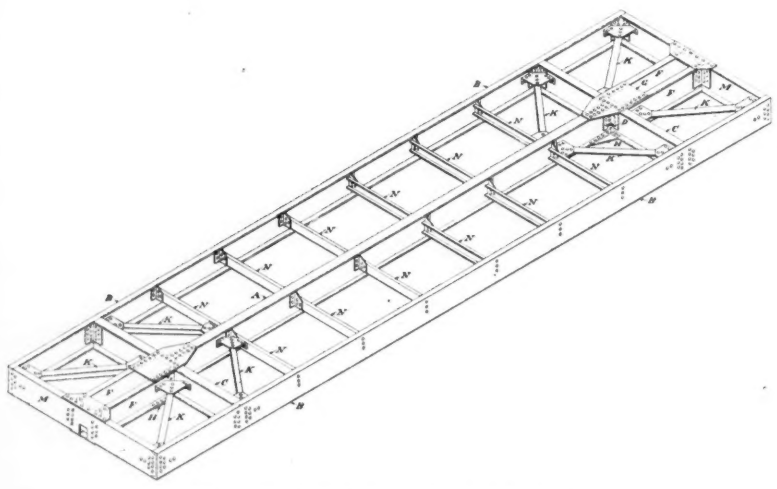


Fig. 1.—Steel Underframe for Freight Cars.

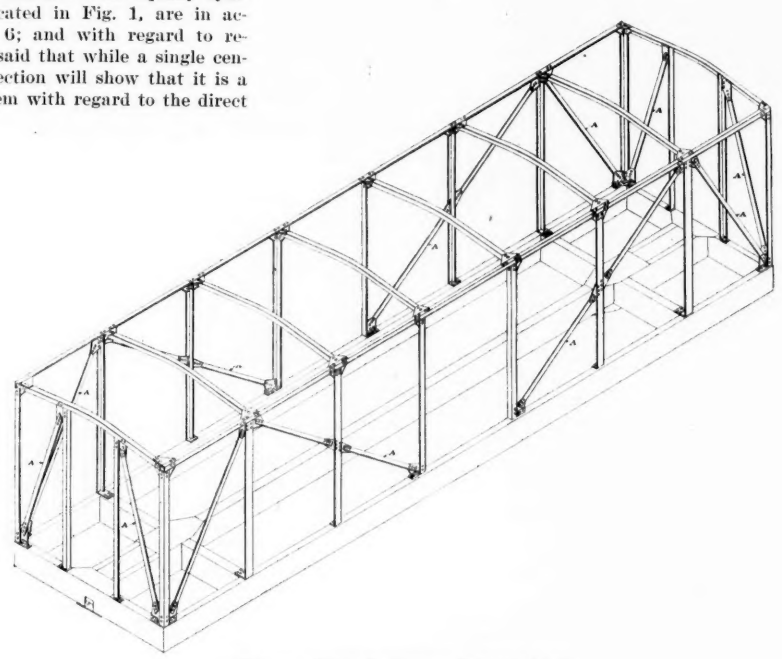


Fig. 2.—Steel Frame for Freight Cars.

The system of under-framing described is applicable to a flat, gondola, drop bottom, hopper bottom or box car, the framing being substantially the same in all cases, only the floor and upper structure differing. It will also be clear that the floor and upper framing may be constructed of wood or steel as required. The system of under-framing can also be used in combination with the system of upper framing for a box car as shown in Fig. 2. In this case it is assumed that the under-framing is sufficiently strong to carry its dead and applied loads without any assistance from the upper framing, and, therefore, the strength of the upper framing need not be considered beyond its ability to withstand wind, inertia and other shocks incidental to the ordinary operation of cars in service. This arrangement is an advantageous one, for each portion of the under and upper framing can then be considered more definitely with regard to its purpose, thus admitting of a reasonably correct design and an economical use of material. The use of "angle" or "T" section carlins, as shown in the arrangement of the upper framing (Fig. 2), results in a decided gain in head room, and to an extent equal to the difference between the depth of the steel section employed and that of the wooden carlin which otherwise might be used. It may also be noticed that this system of upper framing admits of the application of either wood or steel as the material for the car siding, lining or roofing.

If car framing, and car construction generally, gave rise to no questions after purchase and delivery of the car, there would be no need to dwell any longer upon this subject. But the primary object of a car's existence is that it be placed in active service and kept there as long as it can be used, the commercial value of the car being altogether dependent upon its period of useful activity. An active life, however, implies exposure to the inevitable process of material "wear and tear;" it also means the possibility of coming in contact with sundry distorting and destructive forces from which even the best of steel cars may not be exempt. The problem of car construction is, therefore, incomplete unless proper consideration be given the question of renewals, replacements and repairs. Some thought should also be given the matter of tools and appliances needed, for it will, of course, be recognized that the repairing of steel cars of any form will require the use of tools and appliances quite different from those which are sufficient for repairing cars built of wood. The range of tools and facilities required will depend altogether upon the type of steel car selected, being complex or simple in direct proportion to the complexity or simplicity of the car to be repaired. That tools and appliances will, eventually, be found necessary may be granted. For steel cars are not without their limits of endurance, and sooner or later they will stand in need of attention and repairs. Hence the necessity for a timely consideration of that which is desirable from the broadest point of view with regard to the construction of steel cars. With these thoughts in mind it may be noted that in the system of under-framing herein considered it has been shown that there are few principal members, and that these are arranged in what is believed to be the best manner consistent with their purpose. It has also been shown that these members are of the regular and standard commercial sections, and therefore such as may be readily procured throughout a large portion of the area traversed by railroads. Furthermore, the design of the under-framing is entirely free from complexity, and the connections of the principal as well as those of the subordinate members are in keeping with the simple character of the construction, all of which constitute, as a whole, conditions the significance and importance of which can best be appreciated by those concerned with the cost and operation of car repairing.

As an argument against the use of rolled commercial sections for car construction, the statement is occasionally made that a car constructed of commercial sections is necessarily heavier than one of similar capacity built of pressed steel shapes. It is noticeable, however, that the only figures accompanying such statements are those referring to the dead weight of the car and its assumed and stenciled load capacity. For the purpose of a proper and direct comparison, the dead load should be expressed in terms of the ultimate carrying capacity of the car; or if the stenciled load capacity is desired as a base for consideration, it would be well to know what relation the stenciled capacity bears to the ultimate load capacity of the car. In other words, for a given form of loading—say, uniformly distributed—what is the factor of safety considered with reference to a static load of so many thousand pounds? This form of treatment would admit of a direct comparison being made, but in the absence of this, or similar direct information, a mere reference to a stenciled capacity is scarcely sufficient for purposes of comparison.

It has already been stated that one of the advantages in connection with the system of under-framing herein described, is in the fact that by the use of standard commercial shapes it is possible to calculate within close limits just what sectional elements are required for a car of any reasonable length and capacity. It follows, therefore, that if the dimensions of the sections entering into such a system of under-framing as the one described are known, the ultimate carrying capacity of the structure can readily be determined. The value of this feature is self-evident in that it enables those interested to ascertain the strength of the car, and this with a degree of precision rather difficult of attainment in the case of pressed steel shapes, whose original strength may be more or less reduced by the distorting and straining action practically inseparable from the process of manufacture.

*From a paper before the Western Railway Club, March 19.

The Dayton Twin-Spring Draft Rigging.

In our issue of Feb. 22 we published the results of some severe service tests of draft gear on the Atchison, Topeka & Santa Fe, which tests included the Dayton rigging. It seems unnecessary at this time to review those trials which were so recently published in full and commented on, and it is probably enough to say that in those tests they were unable to break a loaded train in two weighing 2,005 gross tons, excluding the two engines and the caboose. At the time the tests were reported we had very meager data concerning the construction of the draft gear, so that the accompanying engraving will be of interest as showing the style of the Dayton rigging, which was one of those used in the tests. This is shown in Fig. 1.

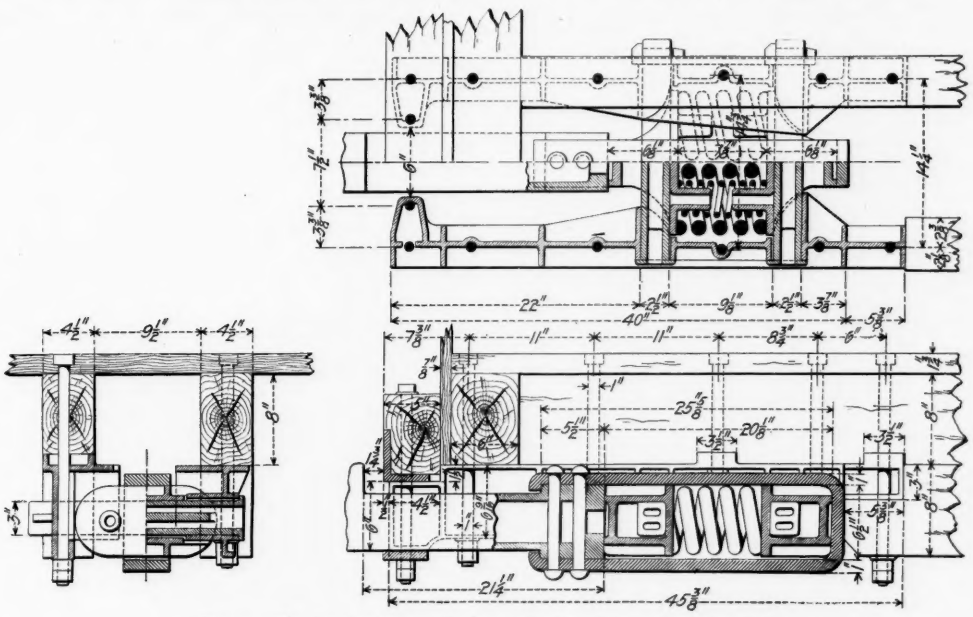


Fig. 1.—The Dayton Twin-Spring Draft Gear—Wood Center Sills.

It will be seen that it is of the twin-spring type, and that malleable draft beams are used, 45⅜ in. long. At the rear the beams are backed up by 4½ x 8 in. timbers which extend to the body bolster. At the front of each beam there is a shoulder, 1½ in. deep, engaging the dead block, and also there are two lugs on the upper side of each beam which project into the center sills. One-inch vertical bolts are used to fasten the draft beams to the sills. Rectangular stop bars made of malleable iron are used which extend through the followers and draft beams and remain in a stationary position. Each follower is a malleable casting with a rectangular opening to admit the stop bar, and vertically this opening is sufficient to permit of the free movement of the followers, while in the horizontal direction the opening is 2⅛ in. greater than the width of the stop bar. Each spring is supported at its end by a boss cast on each follower. A travel of 2 in. is required to close the springs, and the bosses are made of such length that they come in contact before the springs are fully closed.

In Fig. 2 is shown a Dayton twin-spring rigging applied to some Santa Fe 80,000-lb. box cars having steel center sills, the rest of the framing being wood. The malleable draft beams are here placed between the sills, and are riveted to them. A shoulder engages the end sill and another dead block which must assist materially in transmitting pulling forces to the underframe. Short stop bars are here used having a hole cored through the center to take a 1⅛-in. bolt. These horizontal bolts also act as cross-ties for the center sills. The fastenings and arrangement of the followers are clearly shown by the engraving.

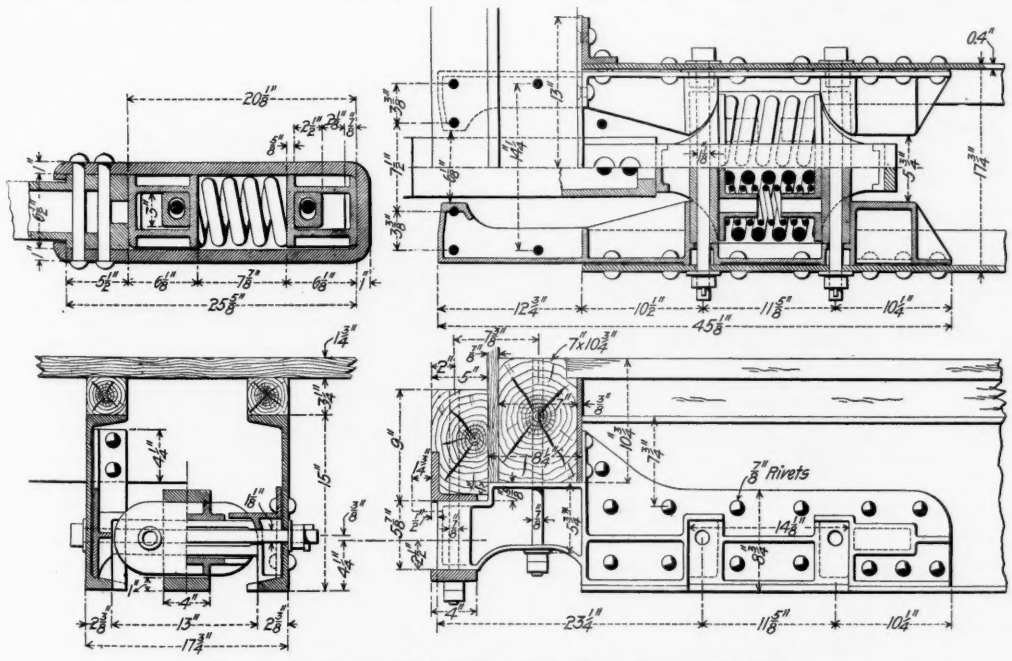


Fig. 2.—The Dayton Twin-Spring Draft Gear—Steel Center Sills.

A Bridge Contract and the New York Labor Law.

On another page is a synopsis and discussion of the recent decision which pronounced unconstitutional the "prevailing rate of wages" clause of the labor laws of the State of New York. It will be remembered that some time ago suit was brought by Julius Meyers, as a taxpayer of the city of New York, against the Commissioners of the New East River bridge to nullify the contract entered into by the Commissioners with the Pennsylvania Steel Company for the approaches to the bridge. Friday of last week the Appellate Division of the Supreme Court of the State of New York rendered a decision pronouncing the contract invalid because it contains provisions required to meet laws which are invalid. In the original suit objections were made to the requirements of the Commissioners that bids should be received only from parties experienced in work of the sort to be done, but the decision now rendered holds the contract to be good so far as this requirement goes. It is annulled simply because it contained illegal provisions introduced to meet the requirements of the labor law. Justice Ramsey said:

"At the time these proposals were made it was supposed that this law was constitutional, and as to these particular provisions the Bridge Commissioners had no unrestricted power because the statute expressly required that they should be inserted in every contract for public work thereafter made, and it must be assumed that the Bridge Commissioners when they imposed these restrictions upon the contract did not do so of their own free will, but because the statute then in force and supposed to be valid compelled them to do so.

"It is alleged in the complaint that these requirements tended to increase the price of the work by compelling the contractor to pay a greater amount for the labor employed by him than he otherwise would be compelled to do if allowed to pay wages regulated only by the law of supply and demand, and if he were not restricted in the employment of labor by preferring citizens of the State of New York. These allegations are admitted. Therefore we have this condition of affairs; that the law imposed upon the Bridge Commissioners the duty of requiring that their contractors should agree to pay the prevailing rate of wages and employ only citizens of the State of New York; that the law compelling such requirements is unconstitutional; that the effect of it is unduly to increase the price necessary to be paid, and it necessarily follows, as it seems to me, that the insertion of any requirement in the contract which unduly increases the price to be paid for the work operates as a waste of the public money.

"One reason why this law was held to be unconstitutional was that it unduly enhanced the expense of all work done for the city, and it was said that where the expense of the work is enlarged beyond the actual and reasonable cost under business conditions the result was to take the property of the taxpayers of the city, who were finally called upon to bear the expense, without the due process of law. It necessarily follows that the Bridge Commissioners, in inserting these provisions, did that which they had no power to do, and because it is conceded that the necessary result of it is to waste the public funds the complaint in that regard is sufficient, and therefore the demurrer should be overruled."

East River Bridge, No. 4, New York.

The fourth bridge to be built across the East River at New York city, the plans of which were recently approved by the Secretary of War, will extend from between Fifty-ninth and Sixtieth streets and Second avenue, Manhattan Borough, across Blackwell's Island and both channels of the river to Hunter avenue and Jane street, Long Island City. Each approach will consist of a masonry ramp and a plate girder viaduct. The lengths of the different parts of the structure will be as follows: Manhattan approach, 1,101 ft.; west anchor arm, 469½ ft.; west channel span, 1,155 ft.; Blackwell's Island connecting span, 592½ ft.; east channel span, 1,002 ft.; Queens anchor arm span, 469½ ft.; Queens approach, 3,441.6 ft., making the total length 8,231.1 ft. The three spans will be of cantilever design. The roadway and bottom cords of the main spans will be horizontal between the approximate centers of the channel spans, and from these points will descend to grade at the terminals with a slope of 3.41 per cent. at the west end, and 2.33 per cent. at the east end. The minimum clearances above the ground of the main spans are about 60 ft. at the west anchor arm, 100 ft. at the east anchor arm and 130 ft. at the highest point above mean high water of spring tides over the river. The minimum heights at the pier head lines above mean high water will be about 120 ft. The Government requires 135 ft. navigation clearances for about 475 ft. on the east side of the west channel span, and on the west side of the east channel span.

The approximate weight of the superstructure for the main spans is estimated at 33,000 tons. The piers will be of masonry built in open excavations, with foundations on solid rock, not more than 25 ft. below the surface of the ground. The shore piers will suffice for the anchorages of the end spans. Elevators are planned for side entrances to the approaches near the end piers. The bridge will accommodate two elevated railroads, two double roads for trolley lines, paths for bicycle riders, footpaths, roadways for heavy teams and also roadways for lighter vehicles.

The location and general design of the bridge is not subject to further change, but some modifications may be made in the positions of the piers and in the details of the superstructure. The plans and estimates are being prepared under the direction of Mr. R. S. Buck, Chief Engineer in Charge of the bridge, for the Department of Bridges. Mr. John L. Shea is Commissioner, and Mr. S. R. Probasco is Chief Engineer of the Department of Bridges.

A Train Lighted by Acetylene Gas.

A train of the Texas Midland, consisting of a combination baggage and mail car, a chair car, passenger coach and cafe car, has been equipped with acetylene gas apparatus by the Adams & Westlake Co., Chicago. Opal globes are used, which give a soft and even light throughout the car. With the "Adlake" system of acetylene gas lighting each car has its own gas plant, making its gas as needed in proportion to the amount of illumination required; it is independent of any other car or charging station. The calcium carbide, from which the acetylene gas is generated, is placed in portable cartridges, which can be carried on the car, or shipped from point to point as desired, to suit the requirements of the service. Each cartridge contains six baskets, each holding 1½ lbs. of carbide and placed one above the other. In the bottom of each basket is a perforated disc which forms a cover for the basket immediately below it and acts as a distributer of the water and a spray for the carbide. The top basket has one of these discs as a cover on which the water runs until it rises to the top of the perforations, when the water flows through the holes on the carbide in the basket below it. When the carbide in this basket has given up its gas, the water runs off the top of the slack or residue through the small holes in the side of the basket and down the sides of the basket to the perforated plate

below, spraying onto the carbide in this basket. This process continues down to the bottom basket, gas being generated from each basket consecutively.

When the water comes in contact with the carbide, gas is generated. This gas must pass from the cartridge into the distributing system through the same passage way that the water enters the cartridge, and when the gas is passing out of the cartridge water cannot enter. The quantity of gas generated therefore depends on the quantity of water fed to the carbide, and in turn the quantity of water fed to the carbide depends on the quantity of gas generated; so the generation of gas is controlled without mechanical devices. After passing the water inlet the gas enters the condensing chambers and coil where the moisture is removed by condensation. The condensing chamber has its upper end enlarged to prevent the water of condensation being forced into the coils above by the gas pressure behind it. After passing through the condensing coils, the gas enters the scrubber where it is cleaned, and it then goes into the small receiving tank underneath the car. This tank is provided as a storage to take care of any slight intermission in the passage of the water from basket to basket; also to care for the excess gas due to after generation caused by the dampness remaining in a basket after the water has stopped feeding when the lights are turned off. This tank will take care of the after generation up to 13 lbs. pressure, when a gravity weight valve is released, allowing any gas generated above that pressure to escape into the open air through an escape pipe through the car roof. A regulator is placed underneath the car, between the receiving tank and the lights, to insure a constant gas pressure at the burner tips and an even and steady light.

Each burner in the Texas Midland cars is fitted with an electric igniter. The chandeliers are especially designed for burning acetylene gas and are also arranged to act as ventilators for the interior of the car. The generating apparatus is placed in a cabinet and occupies a floor space of 11 x 22 in. However, in this system it can be placed on the end of the car, or any partition allowing 6 ft. 6 in. head room.

New Passenger Locomotives for the Lake Shore & Michigan Southern.

The Brooks Locomotive Works has recently built two new wide fire-box passenger locomotives for the Lake Shore & Michigan Southern having six 80-in. drivers coupled and a pair of leading and a pair of trailing wheels. They are practically the same weight as the last 10-wheelers built for that road and illustrated in our issue of Nov. 10, 1899, but larger grates are used, and it is expected that these new class "J" engines will be better able to handle heavy trains in bad weather than the 10-wheelers. The details are essentially the latest practice of the Brooks Works, excepting in a few instances where they have been altered to suit the particular case in hand. How near the main dimensions of these two classes of engines are alike is well shown by the following comparative table of dimensions:

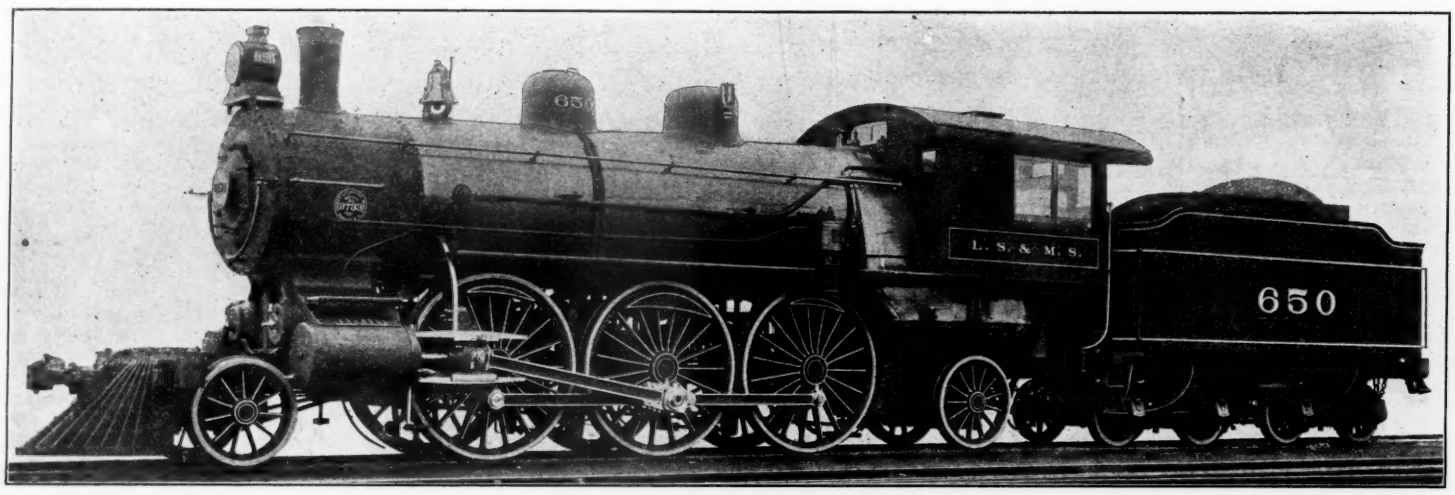
	Ten-wheeler.	Class "J."
Cylinders (in.)	20 x 28	20½ x 28
Drivers, number	6	6
Drivers, diameter (in.)	80	80
Steam pressure (lbs.)	210	200
Weight on drivers (lbs.)	133,000	130,000
Weight, total (lbs.)	171,600	174,500
Heating surface, tubes (sq. ft.)	2,694	3,169
Heating surface, fire-box and arch tubes (sq. ft.)	223	174
Heating surface, total (sq. ft.)	2,917	3,343
Grate area (sq. ft.)	33.6	48.5
Height, center of boiler above rail (in.)	110	110
Boiler, diameter of barrel (in.)	66	66
Tubes, number	345	285
Tubes, diameter (in.)	2	2¼
Tubes, length (in.)	180¼	228
Fire-box, width (in.)	41	84
Fire-box, length (in.)	121	85
Firebox, depth front (in.)	78	68
Fire-box, depth back (in.)	63½	68

The tractive power of both classes is practically the same, or a little less than 25,000 lbs. The class "J" engines have 3,343 sq. ft. of heating surface against 2,917 sq. ft. for the 10-wheelers, but the increase results from the use of 19 ft. tubes, forming heating surface of somewhat doubtful value; the class "J" engines have the smaller fire-box heating surface. The effect of these changes may in a way be shown by equating the heating surfaces on the basis that a square foot of fire-box heating surface is worth about 10 of tubes, which is probably too small a ratio in this case. Apparently there is very little difference in the boiler capacities and the chief advantage of the class "J" would seem to be that it has wide grates, making the firing easier.

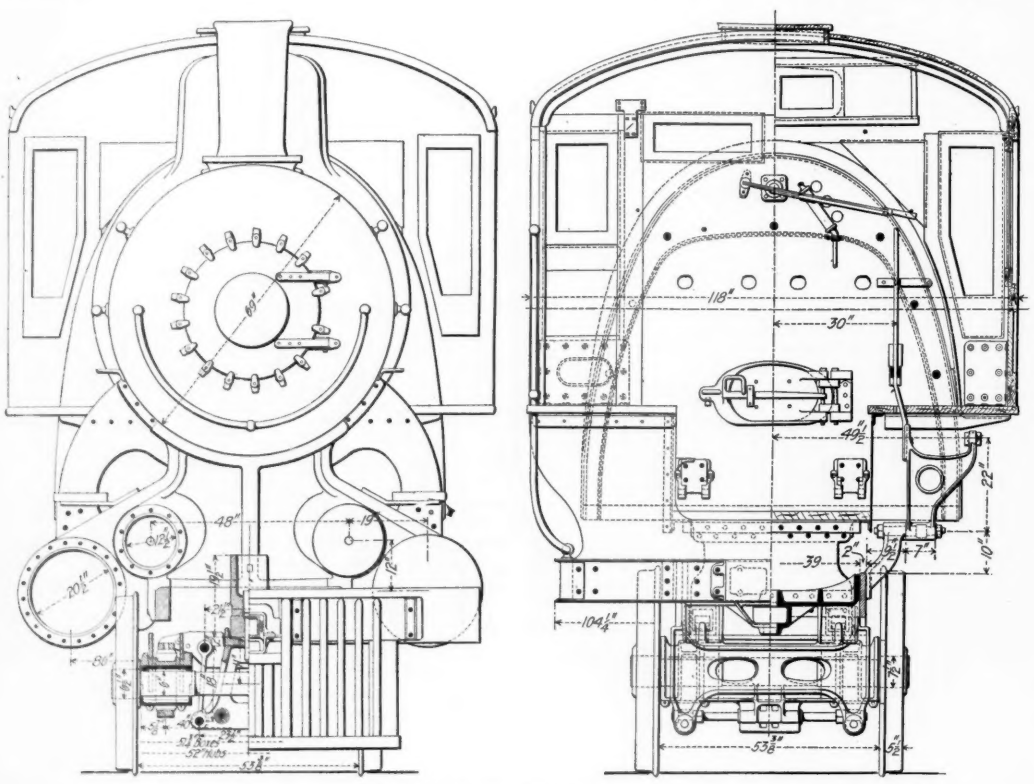
The boiler is of the extended wagon top type with a sloping back head; and the throat is also sloped to clear the rear driving wheels. The fire-box end of the boiler is supported on expansion plates at the front and at the back. The barrel of the boiler, which is unusually long, is joined to the frames by three expansion plates. Piston valves 11 in. in diam. are used, having inside admission. A radial truck is used at the rear which is like the trucks used on other recent Brooks engines with trailing wheels. A pony truck is used ahead. The drivers only have brakes, these are hung directly from the frames.

The tender loaded weighs 118,000 lbs. and has a capacity for 6,000 gals. of water and 9½ tons of coal. The special equipment includes: American-Westinghouse air-brakes; Westinghouse air-pump; Nathan sight feed lubricators; Ashton safety valves; Hancock injectors; Gold steam heat equipment; A. French springs; U. S. metallic packing for piston rods and a water scoop operated by compressed air which was made by the Brooks Locomotive Works. The following are additional dimensions of the class "J" engines:

Weight on drivers	130,000 lbs.
Weight on front truck	21,500 lbs.
Weight on trailing truck	23,000 lbs.
Weight, total	174,500 lbs.
Wheel base, total of engine	31 ft. 10 in.
Wheel base, driving	14 ft.
Wheel base, total, engine and tender	57 ft. 3¼ in.



Class J Heavy Passenger Engine—Lake Shore & Michigan Southern.



L. S. & M. S. Engine, Class J.

Length over all, engine	43 ft. 5 in.
Length over all, total engine and tender	68 ft. 10⅝ in.
Height of stack above rails	14 ft. 11 in.
Wheels, leading, diam.	42 in.
Wheels, driving, diam.	80 in.
Wheels, trailing, diam.	48 in.
Material of wheel center	All cast steel
Journals, leading axle	6½ x 12 in.
Journals, leading axle, wheel fit	7 in.
Journals, driving axle	9 x 12 in.
Journals, driving axle, wheel fit	9½ in.
Journals, trailing axle	7 x 12 in.
Journals, trailing axle, wheel fit	7½ in.
Piston rod, diam.	3⅝
Main rod length center to center	99 in.
Steam ports length	26½ in.
Steam ports width	2 in.
Exhaust ports, least area	75 sq. in.
Bridge width	3 in.
Valves, kind of	Piston
Valves, greatest travel	5½ in.
Valves, steam lap (inside)	1⅛ in.
Valves, exhaust clearance (outside)	⅛ in.
Lead in full gear	1-16 in. positive
Boiler, material in barrel	Steel
Boiler, thickness of material in shell	⅝, 11-16, ¾, 9-16 and ½ in.
Boiler, thickness of tube sheet	¾ in.
Boiler, diam. of barrel, front	66 in.
Boiler, diam. of barrel at throat	73 in.
Seams, kind of horizontal	Sextuple riveted
Seams, kind of circumferential	Double and triple riveted
Crown sheet, stayed with	Radial stays
Dome, diam., inside	30 in.
Fire-box, material	Steel
Fire-box, thickness of sheets	Crown, ⅜; tube, ½; side and back ⅜ in.
Fire-box, brick arch	On water tubes
Fire-box, mud ring, width	Back and sides, 3½ in.; front, 4 in.
Fire-box, water space at top	Back, 4½ in.; sides, 5 in.
Grates, kind of	Cast iron, rocking
Tubes, number of	285
Tubes, material	Charcoal iron
Tubes, outside diam.	2¼ in.
Tubes, thickness	No. 11 B. W. G
Tubes, length over tube sheets	19 ft.
Smoke-box, diam., outside	69 in.
Smoke-box, length from tube sheet	66 in.
Exhaust nozzle	Single.
Exhaust nozzle	Permanent
Exhaust nozzle, diam.	5½ in.
Exhaust nozzle, distance of tip below center, of boiler	4 in.
Netting	Wire
Netting, size of mesh	2½ x 2½ in.
Stack	Cast iron taper
Stack, least diam.	15 in.
Stack, greatest diam.	16¾ in.
Stack, height above smoke-box	34½ in.

Tender.

Type	8-wheel, steel frame
Tank, type	U-shape, hopper
Tank, capacity for water	6,000 gallons
Tank, capacity for coal	9½ tons
Tank, material	Steel
Tank, thickness of sheets	¼ in.
Type of underframe	Steel channel

Type of springs	Triple elliptic
Diam. of wheels	36 in.
Diam. and length of journals	5½ x 10 in.
Distance between centers of journals	5 ft. 6 in.
Diam. of wheel fit on axle	6⅞ in.
Diam. of center of axle	5⅞ in.
Length of tender over bumper beams	21 ft. 10½ in.
Length of tank inside	20 ft. 4 in.
Width of tank inside	9 ft. 10 in.
Height of tank not including collar	60 in.
Type of draw gear	M. C. B. coupler

The Meeting of the Maintenance of Way Association.

(Continued from page 198.)

We continue this week the report of the committee reports and discussions of the American Railway Engineering and Maintenance of Way Association as presented at the recent meeting at Chicago. Space forbids our presentation of either reports or discussions at much length, and naturally many valuable suggestions and items of information must be omitted.

Ties.—The Chairman of the Committee on Ties was Mr. Kruttschnitt, of the Southern Pacific, and the report was presented by Mr. Kittredge, of the Cleveland, Cincinnati, Chicago & St. Louis. The report contains a good deal of valuable statistical information as to the cost of treated and untreated ties, as to average life, cost of renewals, etc. These statistics are presented in tables which it is impracticable for us to reproduce. A few extracts from the report and discussion follow:

For convenience in handling the subject of this report and on account of the wide geographical separation of the different members of the committee, it was considered best by the Chairman to assign to each member of the committee one of the sub-heads into which the general subject is divided for special consideration and report. The assignments of subjects were:

1. "Material," to Mr. W. L. Darling, Assistant Chief Engineer Northern Pacific Railroad.
2. "Preservation," to Mr. O. Chanute, Consulting Engineer.
3. "Inspection," to Mr. J. J. Frey, President Florence & Cripple Creek Railway.
4. "Cost," to Mr. J. C. Nelson, Division Engineer New York Central Railroad.
5. "Disposition of Old Ties," to Mr. Wm. Archer, Principal Assistant Engineer Baltimore & Ohio Southwestern Railroad.
6. "Methods," to Mr. W. C. Cushing, Superintendent Pennsylvania Lines West, Pittsburgh.
7. "General Questions," to Mr. Lewis Kingman, Chief Engineer Mexican Central Railway.
8. "Statistics," to Mr. G. W. Kittredge, Chief Engineer Cleveland, Cincinnati, Chicago & St. Louis Railway.

Two of these sub-committees made no report.

1. Material.—Up to the present time each railroad company has found it best and most economical to use cross-ties made from those timbers which are nearest to its territory, and therefore the most available and economical. The value of these woods is consequently pretty well known to the adjacent railroad companies. For instance, it is well known to the companies operating in the Eastern, Middle and some of the Western states that a life of 8 and 9 years is obtained in main tracks for white oak ties, and that they are the best ties which they can obtain. The Canadian roads are restricted to the use of cedar and hemlock for the most part, the Southern roads to yellow pine and the Western roads to mountain pine and redwood.

The Eastern and Middle states roads are now finding that they are compelled to go farther each year to secure the valuable white oak ties, and that at the same time the price is steadily increasing, indicating a growing scarcity of the supply. They will therefore make inroads on the timbers considered less valuable for cross-ties, such as yellow pine, hemlock, cedar, tamarack, mountain pine and redwood, which additional consumption reduces the available supply for roads now using these timbers, and hence the tie question is becoming of importance to all the consumers.

The subject of metal ties has received so little attention in this country, and the cost as compared with wooden ties, is so great, that this does not appear at present to be a live question.

2. Preservation.—The report of Mr. O. Chanute, Sub-Committee on Preservation, is given in full by the committee, but only very briefly here: The coming necessities are bringing forward a number of advertised processes for discussion and attention. These may be divided into two classes: First—External application; second—Injections of chemicals under pressure. They will be discussed separately.

There are a number of compositions which are being promoted, to be applied by painting or by soaking. It is probable that the success is due either to favorable exposures or to the application of large quantities of the composition. Diligent inquiries have quite failed in procuring data as to the quantities absorbed by the ties whose long life is reported, and the amounts now recommended by the manufacturers of the products appear to be estimates.

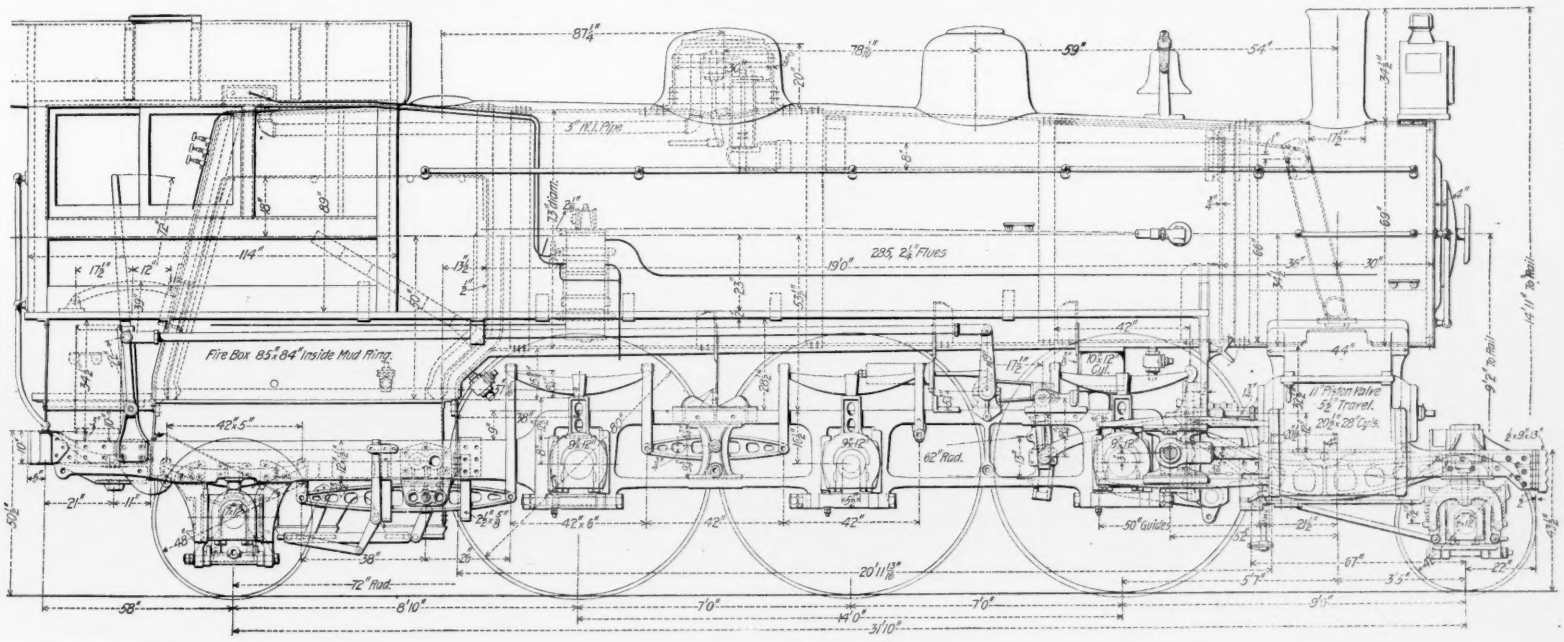
Table No. 1 condenses the claims made for the principal external applications now in the market:

Table I.—Preservatives for Painting or Soaking.

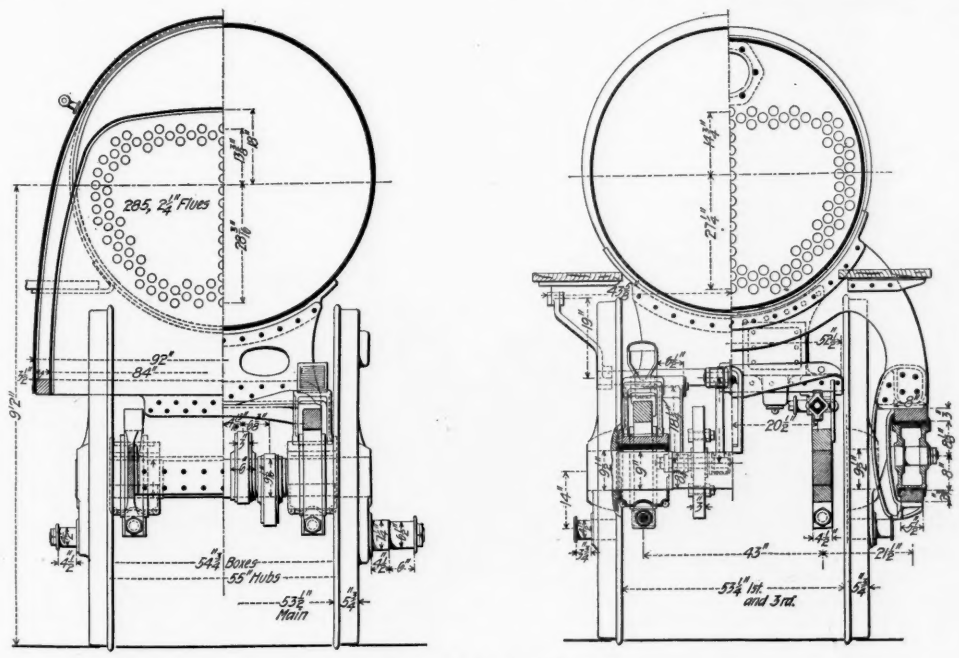
Name.	Price Per Gallon, Cents.	Quantity Per Tie, Gallons.	Cost Per Tie, Cents.	Life Claimed, Years.
Carbolineum avenarius.	80	¼	15 - 20	7 - 18
Ligni salvor.	..	¼	.....	.....
Woodiline	25	½	15 - 18	6 - 14
Spirittine	25	½	12½	7 - 18
Wood preservative.	Distilled from pine, used by Pennsylvania Railroad for car work.			

A good many different chemicals have been experimented with for preserving ties. Of these corrosive sublimate, sulphate of copper, chloride of zinc and creosote have proved their superiority over others, but the first two are now practically abandoned, and only the latter two remain in extensive use.

Table II. exhibits the particulars of these various plants and of some others which creosote or work other processes. The estimated capacities are as stated by the parties and are given in ties which can be treated in a year, although the creosoting plants practically do none of this class of injection, but operate on piles and timber, upon which they do good work.



Lake Shore & Michigan Southern Engine, Class J.



L. S. & M. S. Engine, Class J.

Let us take the Southern Pacific as an example. The untreated pine ties cost about 50 cents each when laid in the track in their natural state, and last some four years; this produces a charge of 12½ cents a year per tie, while if, when treated, they cost, say, 66 cents each when laid in the track, and last at least 8.25 years, they then produce an annual charge of 8 cents per tie. The economy will vary on different roads; on some there will be none at all. Each railway must consider the problem for itself and the present report can only state general facts.

The committee has received the results up to date of an interesting experiment in West Texas on a piece of new line built by the Southern Pacific Company in September, 1895. It is well known that the action of chloride of zinc is to shorten the grain of timber, and many yellow pine ties treated with this preservative are removed from the track on account of shattering or separation of fibers long before decay sets in. This trouble forced itself on the attention of the officers, and it was decided to lay an experimental lot of yellow pine ties, impregnated with so small a quantity of creosote oil as to make the total cost of treatment reasonably small. Accordingly, 1,694 sap pine ties, cut at East Texas mills, were impregnated with .68 of a gallon of creosote per cubic foot, or 1.8 gallons per tie, at a total cost of treatment of about 19 cents per tie at the works. At the

same time, about the same number of untreated pine ties of the same character were laid alongside the creosoted ones. At the beginning of this year, or after five years' and four months' service, not a single one of the creosoted ties ahad been removed from the track, while 292 of the common pine ties, or 16 per cent. of the total number put in, had been taken out on account of decay. If the thorough sterilization of the timber in the retorts and the subsequent injection of so small a quantity of oil as .68 of a gallon per cubic foot, which amounts to but little more than what might be termed a thorough soaking, will add materially to the life of ties at a cost of 19 or 20 cents, and if it will remove the objections of splintering, which, with the variety of pine in question, is one of the greatest objections to Burnettizing, as well as the trouble from the extreme solubility of the zinc salt, the experiment would seem to offer considerable promise of a solution of a serious problem.

TABLE II.—PRINCIPAL WOOD-TREATING PLANTS.

Location.	Year Built.	Owner.	Process.	Estimated Capacity Ties per annum.
Lowell, Mass.	1848	Locks & Canal Co.	Kyanizing	30,000
Las Vegas, N. M.	1885	Atchison, Topeka & Santa Fe Ry.	Zinc-tannin	500,000
Bellemont, Ariz.	1898	Atchison, Topeka & Santa Fe Ry.	Zinc-tannin	350,000
Chicago, Ill.	1886	C. Tie Preserving Co.	Zinc-tannin	500,000
Mt. Vernon, Ill.	1899	C. Tie Preserving Co.	Zinc-tannin	200,000
Houston, Tex.	1891	Southern Pacific Co.	Burnettizing	1,500,000
California	1894	Southern Pacific Co.	Burnettizing	1,000,000
Oakland, Cal.	1889	Southern Pacific Co.	Creosoting	1,000,000
Edgemont, S. D.	1899	C., B. & Q. R. R.	Burnettizing	500,000
Somerville, Tex.	1897	T. Tie & Lumber Co.	Zinc-tannin	2,000,000
Beaumont, Tex.	1897	International Creosote & C. Co.	Various	500,000
Perth Amboy, N. J.	1890	Barschall Co.	Hasselmann	1,000,000
Perth Amboy, N. J.	1895	U. S. Wood P'g Co.	Creosote resinate	1,200,000
Brooklyn, N. Y.	1878	Eppinger & Russell	Creosoting	800,000
Norfolk, Va.	1896	N. Creosoting Co.	Creosoting	900,000
W. Pascagoula	1876	Louisville & Nashville R. R.	Creosoting	400,000

3. Inspection.—It is necessary only to say in regard to inspection in purchasing that the inspector must be given no latitude as to the interpretation of the specifications, which should be so explicit as to leave no opening for a misunderstanding. In case of injustice on the part of the inspector, appeal should always be had to his superiors, and an adjustment made. Each tie must be turned over and examined by the inspector and so marked on the end that the mark cannot be changed or obliterated by the weather. Inspection after removal for condemnation or reuse is most important and should be done by competent authority.

7. General Questions.—In renewing ties, if there is any irregularity in size, the larger ones should be placed under the joints. Holes left in serviceable ties when spikes are drawn should always be plugged with wooden plugs. New ties carried in stock for use should be piled with spaces of an inch between them, so as to allow the free circulation of air. This can be best accomplished by placing the ties alternately parallel with and perpendicular to the line of track, the end ties in the pile being turned up on their edge. This allows for the circulation of air. Old ties should be gathered at the end of each day's work and neatly piled for loading on cars. Those classified to be again used in sidings or other tracks should be piled parallel with the rails; those to be used for fence-posts and fuel should be piled at right angles to the rails. The fuel ties should be promptly removed to fuel stations. Ties entirely useless should be condemned by the roadmaster and burned promptly on their removal from track. Ties misplaced by trespassers should be promptly repiled.

Where tie-plates are used no adzing of ties under them should be permitted except such as may be absolutely necessary to make a flat and even bearing for the tie-plates on split and hewed ties. Such adzing should be done with care to avoid waste of timber. Ties should not be adzed to give the tie-plates a bevel. Where tie-plates are not used, no adzing of the ties under the rail should be permitted, except such as is necessary for "straightening up" rail which has rolled; in such cases roadmasters should supervise the work carefully to make sure that the wood is not cut down beyond an absolutely necessary depth.

Tie-plates have now become a well-established article of manufacture. Those principally in use consist of flat-rolled steel, with ribs and surfaces of various forms. Their utility for saving soft ties is so well established that it seems superfluous to report in favor of their use. In setting tie-plates, they should be set squarely upon the ties and be firmly imbedded in them, so as to place the bottom of the tie-plates exactly flush with the tops of the ties. They should not be left partly driven, with a view of having them forced down by the weight of a train. Where tie-plates are punched for more than one section of rail, care should be taken to place the plates on the ties with the gage side of plate corresponding with the gage side of rail. This is important for the reason that unless it is followed heavy rail cannot be laid to replace lighter sections without removing the tie-plates. For the convenience of sectionmen the shape of the hole punched on the side next to the flange of rail and on the gage side of plate should be indicative of the weight of the rail to be used.

Discussion.

Dr. H. Von Schrenk, Instructor in the Shaw School of Botany, St. Louis, Mo.—The idea that wood decay is due to some process of oxidation or fermentation is one which has given way to a better understanding of this process. We now know that decay is due to the growth and activities of a number of low plants called fungi, the fruiting bodies of which are the familiar toadstools found on living and structural timber. As to the conditions which favor the germination and growth of these fungi, moisture is the most important requisite; without water the fungus cannot grow. For this reason the ties in a well-drained roadbed will last longer than those in a poorly drained one. Heat is another factor. Decay goes on faster in warm weather than in cold weather. Wood which contains starches, sugars or oils in some of its cells—that is, sap wood—offers a more abundant food supply than the heart wood, which has none of these products.

The point I wish to call particular attention to and to emphasize is the fact that wood of itself will not rot or decay. It may be kept for 25 years or more (and this has been done) without decaying. Well-known instances of this kind may be found in buried timber, where the conditions are such that fungi cannot grow. All decay proceeds from without inward in wood like a tie (except where boring insects allow spores to penetrate into the interior of the wood); furthermore that the appearance of the fruiting bodies of fungi on a piece of wood is always an indication that the wood is already decayed. To sum up, decay is a chemical process induced by ferments given off by the threads of low plants growing in the wood.

We come now to the consideration of the all-important question: How can the growth of these plants be prevented? This may be done either by keeping away the fungus or by bringing about conditions in the wood which will not allow of the development of the fungus. The first cannot be accomplished entirely, but much can be done by avoiding the accumulation of dead wood along the right of way, particularly of decayed ties, so that the formation of fruiting bodies may be prevented; furthermore by discouraging wasteful lumbering methods, for it must not be forgotten that all these wood destroying fungi come from the forests, and the more dead wood there is near the track the more spores will be found. The more feasible and sure way of preventing decay has been found to be by injecting the wood with various chemical substances.

Mr. F. T. Hatch, Vandalia lines.—There is one part of the doctor's remarks that struck me very forcibly, and that is the gathering up and removing of the dead wood, and it appears that very many of us have never thought of the dead wood along the right of way as having anything to do with the rotting of the ties. We ought to pay more attention to that.

Mr. Curtis.—I notice the report sheet of the preservatives to be used by soaking or painting gives a list of some five of these. When I was investigating the subject originally the result of my effort was that there was absolutely no information of any value whatever, so far as the use of these external applications went, to ties. At that time most of the companies admitted they had no evidence whatever showing the value or tending to show the value of any of these preservatives. Since then I understand there has been something made in their favor, but the evidences are extremely scanty. It is, of course, unwise to speak unfavorably of anything of which we have no evidence. I have no confidence in the ultimate success of any treatment which is in the nature of an outside application of paint. You cannot make a tie of much consequence by painting it over or by soaking.

The Chicago, Rock Island & Pacific is referred to here, and I will say with reference to that road that when I wrote my paper on this subject three years ago, there was considerable doubt in the minds of some as to the results obtained on that road. The figures since then, which I think have been much more carefully kept, demonstrate to my mind that the previous records were essentially correct; but I think there is no question as to the treated hemlock ties. There is a slight reference to some results on the Missouri River side, and I will refer to an experimental lot of ties laid on four sections of this road just west of the Missouri River. This consisted of 22,000 treated hemlock and 50,000 oak untreated. The result at the end of twelve years showed there were 63 per cent. of the treated hemlock ties which had been removed after 12 years, and 74 per cent. of the white oak had been removed. I have just received advices of the count made at the last end of 1900, which showed that of the 22,000 treated hemlock put in in 1886 there are 2,600 still in the tracks, and of the 50,000 white oaks there were 2,400 still in the tracks.

The data on the Southern Pacific, as given in the report on page 5, is, of course, correct, but it is not brought down to date. One of the questions frequently asked is for the evidence of result of the treatment where ties are subjected to great rainfall, as they are in the Eastern part of this country, for instance. Now, on the Middle Division, or the division that extends from Houston to Glidden, the rainfall at Houston is about 49 in., and at Glidden I think it is about 40 in., which is about as heavy as we have in any part of this country. On this Glidden division the statement is given here that treated ties have lasted six years and eleven months, and nine years and three months on the Del Rio division. The latest reports which bring the Southern Pacific data up to July 1 of last year, are that the average life of the ties so far removed on the Glidden division is seven years and five months, and for the year 1899 the average life of ties removed that year was eight years and six months. For 1900 it is eleven years and five months. I think that must be an error. But the point is this: When you consider the life of the ties that have been removed you are not necessarily getting the life that you derived from the ties, because you have to take into consideration whether you have reached the maximum life of the tie.

The division next to the Glidden division is the San Antonio division, from Glidden to San Antonio. The rainfall there is 30 to 40 in., and my recollection is that the average life is something like nine years so far; that is, the life of those taken out. The average life of the whole road is given in this report as eight years and three months. The last report shows eight years and ten months. That is only for this particular division, and it is not for the entire Atlantic system of the road.

There have been ties laid in other places which possibly may be of interest. I will call attention to one or two instances. On the Pittsburgh, Ft. Wayne & Chicago, in June, 1892, there were 200 tamaracks and 200 white oaks laid in adjoining sections. Up to 1899, seven years afterward, only two of each of these had been removed; two out of 200. In 1900, 71 of the 200 tamaracks and 127 of the 200 white oaks had come out. Now it is not wise to jump at the conclusion that the white oaks are going to be longer lived. Those ties were laid in gravel ballast. In the same report 200 untreated tamaracks and 200 untreated white oaks were laid in adjoining territory on that road in stone ballast. There was one treated hemlock came out in 1897, four in 1898, six in 1899. There were eight white oaks that came out in 1899. None of either came out last year. So that in both cases there have been practically 5 per cent. of those ties removed after eight years' service. Whether the longer life of the hemlocks is due to being laid in stone ballast or due to the superior virtue of the treated hemlock as compared with the treated tamarack is a conundrum I cannot answer.

I notice in the report there is a reference to a test with creosote; that is, a very small amount of creosote, with so far good results. One of the systems of treatment which will probably come to the front within the next two years is the combined zinc and creosote. As you are aware, the Germans have been treating by such a method for some years, with quite satisfactory results. However, the only evidence showing the superiority of this process consists of one lot of ties. It is true those were 72,000 in number, and I believe there was practically none which came out after some eight years' service; but it has not been subjected to the same test in practice that the other systems have. I believe this is unquestionably a good process. In this country there have been a number of efforts made to get good results from the use of creosote and chloride, and of late that has been attempted in the South by the method of injecting first the zinc chloride and then following that by subsequent injections of creosote, using such creosote as would be used for ordinary creosoting work. This has resulted in success so far as securing the injection of the creosote is concerned.

A Member—It was said that there is not use putting any kind of material on the outside; that the tie begins to decay in the heart? What causes the decaying in the heart when it is all covered with some material to keep spores out? When the timber is painted very closely will it begin to decay on the inside?

Mr. Von Schrenk—That is due to the fact that before the timber has been painted these germs of decay have already got into the wood in some way or other, and when you paint the wood you bring about the best condition for the flourishing condition of the germs by making a moist chamber. You cover up the outside of the timber and any moisture that may be in it you very carefully seal and keep for the benefit of the fungus already in the timber, and cause it to flourish. A great many of these fungi get in through small defects which every piece or board of timber has.

Mr. E. B. Cushing, Houston East & West Texas—The Southern Pacific, which has had experience in this matter for a number of years, seem to draw the line of advantage between treated and untreated ties entirely by the conditions of soil and climate. For instance, on the Eastern division of their road they use cypress altogether. The use no Burnettized ties on the Gulf roads. West of San Antonio, in that arid country, they use altogether Burnettized ties, and it does not seem to be with them a question of ballast at all, but one rather of soil and climate and conditions of humidity, rainfall, etc.

I notice in this report of the Committee they refer to a little study of the subject made by the Texas Association of Superintendents, in which we find that in that locality the life of ties varies materially. For instance,

some roads get a life of fifteen years for cypress, while other roads have a life of five years for oak in the same country. This little study that we made of the subject also convinced us of the necessity for systematic records. In our Association there are twelve or fourteen thousand miles of railroad represented, and I think there are some twenty lines composing that mileage, and we found we were unable to get satisfactory reports of over four or five lines. They could tell you how many ties they used in a year, but very few roads could tell how many of those ties were used in construction as against maintenance proper, and, as you see in this statement, it shows that on some roads a renewal of about 200 per year and in the same territory the renewal will be 550 per year. So it led us to the conclusion that it was a question first largely of timber and secondly largely of soil. The International Railroad, which traverses the State in two different directions, uses in one part of its road cypress ties, in another common oak and in another common pine. It seems to me this question should be approached from not only a question of the kind of timber, but largely of the soil and climatic conditions.

Mr. D. W. Lum, Southern Railway—We have a great many different kind of ties in our country, their life depending on the character of the timber. I know that a good many pine ties—so-called—are not pine. I know some ties that are some 17 or 17 or 18 years old. I know them to be 16 years old from my own observation. And there are a great many cedar ties that last from 16 to 18 years where the traffic is not heavy, that is, heavy enough to cause the rail to cut into the tie. And we have several kinds of cypress. The hard cypress is very durable indeed, while the sap cypress will last only a very short time. So that I think in gaging the life of ties we should consider the quality of the timber.

Mr. E. E. Wendt, Assistant Engineer Pittsburgh & Lake Erie—I would suggest to the Committee that it would be well to add to its tables a column in which would be stated the character of the ballast used by the different railroads. The records show that 68 per cent. of the roads reporting found that the average cost of tie removals per tie was ten cents, while 20 per cent. found the average cost was fifteen cents. One road reports as low as one and a half cents per tie, which would indicate that the cost on the Philadelphia & Reading and Pennsylvania lines was ten times as great as on the D. & R. G. It seems to me the roads reporting had not included the same amount of work, and there should be uniformity in the basis of the report. It seems to me that the difference in cost between those reporting ten cents and those reporting fifteen cents has been due primarily to the character of the ballast. If I am not mistaken those reporting ten cents generally have gravel ballast and those reporting fifteen cents generally have stone ballast. In addition to this I feel quite confident that roads using slag ballast would report a slightly higher cost per tie for renewals than those using stone. So it is quite evident that the character of the ballast has much to do with the cost per tie.

Also, I notice that the Committee refers to the value of certain specifications, and I hope that the Committee will submit a set of proper specifications for information, specifications which will govern the Purchasing Agent in the purchase of ties.

Rails.—The Chairman of the Committee on Rails is Mr. R. Trimble, of the Pennsylvania Lines, and the committee includes several gentlemen known as experts in this special branch of railroad engineering.

The Committee found the American Society sections in use on 83 railroads out of 127 reporting; it found that there was an unnecessary variety of weights of this section and also an unnecessary variety of other sections. An analysis of the figures and opinions collected leads the committee to the conclusion that five different weights are enough, namely, 60 lbs., 70, 80, 90 and 100 lbs. per yard.

The Committee found no road reporting axle loads less than 20,000 lbs. and none reporting axle loads over 55,000 lbs. These figures indicate that there are few roads requiring light rail and that a very large number of roads will require 80-lb. and 90-lb. rail.

The American Society sections are giving general satisfaction, but some difficulties have been developed on account of the recent tendency to a lower finishing temperature. The Committee thinks that if rails are to be rolled at a lower temperature the section should be modified, and the sooner the better. The Committee is not prepared, however, to submit new sections.

From the statistics gathered it appears that about 90 per cent. of the railroad mileage is on tangent or less than 2 deg. curves. Therefore, the Committee does not think it necessary to take up the matter of special sections designed to provide for flange wear.

The Committee recommends 33 ft. as the minimum standard length of rail. It recommends also a set of allowances for expansion in laying rail and finally gives as appendices the specifications proposed by the American Branch of Committee No. 1 of the International Association for Testing Materials, also certain recent papers by Mr. Webster, which have already been printed in the *Railroad Gazette*, and a description by Mr. J. H. Wallace, of the Southern Pacific, of an experiment made which is called the Wheeler process rail, that being a rail built up of two different kinds of metal.

With the report is a large table giving a summary of the information gathered by the Committee from different roads, namely, percentage of tangent and curve, number of ties used, standard weight of rail, standard section, standard and experimental lengths, axle load, etc.

Discussion.

Robert Trimble, Principal Assistant Engineer Pennsylvania Lines West—Your Committee believes that at least three suggestions are made in this report which should be acted on, and, if approved, that a sincere effort be made to put them into actual use. The first is the use of longer rails. The Committee recommends 33 ft. for the standard practice. Personally, I am in favor of a longer rail where it can be used economically. I would like to use a rail just as long as I can get it in order to reduce the number of joints, but we have fixed 33 ft. as being the standard length. The Committee also recommends the use of certain weights of rail. Also the use of the expansion table submitted.

In regard to the specifications submitted we do not submit that to this meeting for adoption, and I can hardly say that we submit it for discussion, but as a matter of information. Next year possibly we will be in shape to discuss the matter.

Some substantial progress has been made in the manufacture of rails during the past year. We are going to get a better rail, and one of the things that is bringing this about is the finish of the rail at a lower temperature. There are two processes in use at the present time. One is known as the Kennedy-Morrison process, used by the Carnegie Steel Company. At the Maryland Iron & Steel Co. they do not have this arrangement for detaining the rail, but the process is continuous. At the same time they are rolling these rails at a lower temperature and getting results which are very nearly identical with the ones that are being obtained by the Carnegie Steel Company. This was brought out very clearly in some illustrations in the last number of the *Railroad Gazette*. Probably you have seen them, being interested in the matter. It shows that the Maryland Steel Co. is getting a fine grade rail with the continuous rolling, similar to the one the Carnegie people are getting by detaining the rail in the rolling. A glance at the microscopic section would indicate that the Maryland Steel Co.'s way is as good as, if not better than, the one of the Carnegie Co. Of course, it would take a large number of sections to set forth the facts in the case.

In regard to the use of the American Society's section I have some information from the rail manufacturers which indicates that probably 70 per cent. of the rails rolled during the last year is of that section. Before leaving here I would like to have you look at a section that Mr. Manning presents. He is a member of the Committee and you will note the conclusion that the Committee has drawn from the statistics is somewhat different from the practice that Mr. Manning would recommend to you; but he makes a pretty interesting showing. I would much rather you would use some of Mr. Manning's rails than to buy a 59 or 61-lb. rail.

Mr. H. G. Prout, Editor of the *Railroad Gazette*—It strikes me that we have arrived now at one of the epochs in the history of the development of the rail. In 1893, as you are all aware, after a great deal of discussion and consideration, the American Society of Civil Engineers adopted the section that came to be known by the name of that society. But it is not necessary to go over the history of that. The main doctrine embodied in the American Society's section is what is known as the balanced section; that is to say, giving such distribution of the metal as to equalize temperature. It is a well known fact that there has been some disappointment in the results as the heavier sections have been introduced. The railroad companies have not got the wear out of these very heavy sections that they expected to get, and it is becoming a question as to whether it is worth while to spend so much for heavy rails with the results they get. Now comes in the new set of conditions, one of which is the finishing at a lower temperature, of which the Chairman has just spoken, and another is re-rolling old rails. The Committee makes the suggestion that perhaps it will be better to change the section to adapt it better to these new conditions which have arisen and which seem to be quite practical, namely, the finishing at a lower temperature and rerolling the rails. As to whether or not the section can be properly modified with a view to getting the greatest benefit out of this new condition, is something I shall not discuss. Of course the Committee has considered that very carefully. But it seems now as if we had arrived at another one of those epochs in the history of the development of the rail, and that if it is desirable in order that we may take a new departure and go on to get better rails to change the section which was arrived at after so much consideration and so much study, we should be prepared to face the music.

There is another point suggested as possibly coming in with the method of finishing at lower temperature; namely, that you will get a rail which will answer the purposes without running up the carbon. It would be a mistake to rely entirely upon a cooler finishing in order to get a better quality of rail and sacrifice the benefit of high carbon. I cannot see any sufficient reason why you should not have both. That is, finish the rails at a lower temperature and also have high carbon. If each one is good, why not combine them and get the benefits of the two?

I would like to call your attention to a suggestion that has been made by Mr. Baldwin, of the Pennsylvania Steel Co., which seems to be very pertinent, and that is that the engineers of the railroads can co-operate with the manufacturers by thorough and systematic records.

Mr. Baldwin's suggestion is that the users of the rails should be provided with a very accurate and detailed history of the rail during its manufacture, and then certain rails out of each lot be painted and put in the track and the wear of those rails noted. He suggests an instrument for ascertaining that whereby you could get an accurate determination of the wear of the rails. Then having collected these records, the mill history of the rail from the beginning and its wear you are in a position to collect and compare and proceed to generalize and get something definite as to results.

Mr. C. S. Churchill, Norfolk & Western—I wish to supplement the statement of the Chairman of this Committee. One year ago to-day the statement was made by this Association that we could not get rails rolled at a lower temperature without paying more money, but it was a very desirable thing to get and I think that everybody went away from here with that point in mind that we should all try to get harder rails by a lower temperature. Whether this Association had anything to do with the results or not I think that the same idea distributed among a number of people like this Association does have some weight. The result is coming and we are getting rails to-day cheaper than a year ago, and we are able to get rails at a lower temperature. The Pennsylvania Railroad was advanced a specification that contained a clause reading this way: "The number of passes and speed of trains shall be so regulated that on leaving the rolls at the final pass the temperature of the rail shall not exceed that known as red hot and preferably a dull red." My road adopted that paragraph. We asked for bids from the railmakers and we got quite a number at the same figure that would conform to that class closely. We have alreay received more than one-third of our rails. The first lot was from the Maryland mill, and we think we have a good lot there. The other comes from the National, and they are conforming closely to that paragraph, and the next will be from the Carnegie Co., under the Kennedy-Morrison process. One point that came up was, what was being done at the different mills. I would say that I sent my inspectors, or a number of them, and found that whereas the allowance made for contraction of the rail at the time it left the saws was 6 in. for a 30-ft. rail we have received them considerably less than 6 in. and as low as 5½ in., and that shows that the temperature of the rail at the time it left the saws in our case was lower than it has been in the past.

Mr. Churchill—I am very much interested in the 60-ft. rail from having gone into it considerably in 1892. We have not worn them out on our road under the heaviest traffic. We put in 65 miles and there was no expense connected with the laying or maintenance that was extraordinary in any way. The single question was in first cost. The rail mills refused to furnish those rails without a premium, probably two dollars and a half a ton, and that has decided us not to purchase any more. Of course, the transportation matter came up, but that was not at all serious. It was simply the extra care in loading. The matter of laying on curves was not a difficult matter at all and it was, if anything, easier to lay a curve with 60-ft. rail than with 30-ft. rail. On the manufacturer's side there is a different question. The 60-ft. rail does not cool straight, and very great care is necessary at the mill to see that they are not punished too hard in straightening. The manufacturers are probably correct in their statement that they cannot make 60-ft. rails as cheap as they can 30-ft.

Mr. Trimble—It was formerly my lot to make each year an inspection of about 15 to 20 miles of 60-ft. rail as laid by the Pennsylvania Lines West of Pittsburgh. I cannot see that there is any difficulty at all in regard to the use of a 60-ft. rail. We have looked at the joints carefully and they are no harder to keep up than the joints on a 30-ft. rail, and they are no more battered than the joints on a 30-ft. rail. Of course, 60-ft. rails with no device to prevent creeping will punish the rails more than a 30-ft. rail.

The motion to adopt 33-ft. rails as standard was carried.

Mr. McDonald—In order to get the motion before the house I move the adoption of the Committee's recommendation in regard to expansion. Carried.

Mr. Trimble—In regard to the change of sections I would like to say a word or two. It is with a great deal of hesitation that the Committee broaches the matter of change of section. You will notice that we have not made a definite recommendation to the Association. We felt that we were not quite ready to do it. It is only within the past month or so that these things have developed. I think it was in December that the Carnegie Steel Co. commenced to roll rail at a lower temperature. That is, when they commenced to get definite information as to the difficulty in rolling the American Society sections at a lower temperature. We simply allude to the matter here. It is the expectation that we shall take this matter up with the railroads and see what can be accomplished. The American Society sections have had a pretty hard fight to come into general practice. Now, in the last year about 70 per cent. of the rails rolled by the mills was the American Society section, and the section is coming into greater use each year. Of course if we make a recommendation now of these sections it will upset the confidence of a great many people in sections. We do not want to do it. At the same time if we have to change the sections the sooner it is done the better. We do not feel that we are in shape to discuss the mat-

(*Continued on page 226.*)

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

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In the report of the Maintenance of Way Association Committee on Water Service we find some notes about track tanks. These are said to be an expensive luxury, but almost a necessity on a long road crowded with heavy fast trains, saying, as they do, time of stops for water; they waste from 10 to 25 per cent. of the water; it is expensive to heat them to prevent freezing, and they are costly to maintain. Doubtless this is all true, and yet it may be that we shall soon see a much wider use of track tanks than is now contemplated, except by a few individuals. It seems quite possible that they will be used not only for passenger trains but for freight trains. For the latter their use will come in not only to save the time of water stops but to save the cost of those stops, which appears in several ways, not only in the lost energy, but in the breaking in two of trains and all the resulting operating difficulties. We have been told that all new freight engines for the Lake Shore are now equipped with scoops, although we believe that no steps have yet been taken to put in the additional track tanks necessary to make full use of these water scoops. Perhaps it will always be impossible to avoid considerable waste of water, for the depth of the track tank is necessarily limited, and water must be taken at considerable speed to get the good of this system. The limit of speed at which the Lake Shore scoops can take water has not been discovered, we believe, but naturally the speed will be reduced to avoid accidents as well as to prevent waste of water. It would not be surprising to see within the next few years a great increase in the use of track tanks by freight engines.

The Illinois Central is about to start (perhaps has already started) a good roads train to travel from New Orleans to Chicago, as was recently noted in the columns of the *Railroad Gazette*. The scheme of this work is explained at considerable length on another page. It is a worthy and enlightened enterprise. It is not to be expected that it will result in the immediate building of many miles of good road, but it will result in a few miles in each of many widely scattered centers, and from these few miles others will gradually spread out. The reluctance felt in thin farming communities to spend much money in building good roads proceeds partly from the comparative poverty of such communities and partly from ignorance of methods. The first element can only be overcome by gradual increase of population and wealth. The second can be met by such a demonstration as the Illinois Central proposes to make. For years we have from time to time dwelt upon the desirability of improving approaches to stations on the property immediately controlled by the railroad companies, as one easy method of demonstration in road building. This would doubtless have a good effect not merely as an example of construction, but a good moral effect. The mere sight of approaches, always tidy and always in good condition, whatever the state of the weather, would influence individuals and communities. The railroads have an interest almost as great as the interest of the farmers in good roads in the territory tributary to their various stations. The productive capacity of that territory is increased proportionately as the amount of energy expended in hauling stuff over the roads is diminished and as the thrift and ambition of the population are increased. Furthermore, hard roads at all seasons help to equalize the rate of shipment from country stations in that the farmers are not obliged to haul their produce to the station in dry and pleasant weather. On the contrary, with hard roads the tendency is to use fine weather for field work and to haul to market when the weather is less favorable. Incidentally, we might suggest that the moral obligation resting upon railroads to improve their property and to try to raise the standard in the vicinity of their stations does not end with the roads and drives. As one travels across the country he cannot help noticing the shabby appearance of the majority of the stations. Now, during the era of prosperity, is the time for the railroads to expend liberally in paint and paving materials and well-directed energy in making their stations ornamental or at least presentable.

Narrow and Wide Fire-Boxes.

On another page are the results of some road tests with narrow and wide fire-box engines, burning soft coal, which are of importance to mechanical engineers in general and to locomotive engineers in particular. The results of the evaporation tests, the draft measurements at the fire-box end of the boilers, the draft in the smoke-boxes, the composition of the gases and the temperature of the gases are all very interesting and may be fairly considered the most recent and thorough data of the kind. We have omitted the name of the road at the special request of the Superintendent of Motive Power, but the reader who has closely followed the introduction of wider grates for locomotives will have no trouble in knowing where and by whom the tests were made. These experiments show conclusively that the present movement toward wider grates for soft coal burning engines is a step in the right direction. The tests on their face do not show a wonderful performance as the result of wider grates, but the difference under ordinary conditions of working is important.

The two engines tested were practically the same size, and we would first point out that the wide fire-box engine with a larger grate can be satisfactorily worked with a larger exhaust nozzle than the narrow fire-box engine. This to a good many people is conclusive proof of better efficiency and further contradicts some statements to the contrary which were discussed in our issue of Nov. 30 last. In this particular case, the cylinders of the wide fire-box engine were 19 x 24 in., against the 19 x 26-in. cylinders of the narrow fire-box engine. Other things being equal, one might expect to find a larger exhaust opening used with the larger cylinders, but for all this the exhaust tip of the wide fire-box engine was $\frac{1}{4}$ in. larger in diameter.

In the first tests where the firing was carefully done, but where no special precautions were taken, the wide fire-box boiler showed about 10 per cent. greater evaporation per pound of coal; the coal burned per foot of grate was about 70 lbs. an hour for the wide, against about 117 lbs. for the narrow fire-box engine. This would indicate that the claims for the wide grates were well founded; that an unskilful fireman can do better work with the wide fire-box, and that the larger grates are not worked so near the economical limit so far as combustion is concerned. Where extraordinary precautions were taken in firing and where the grates were shaken every few minutes there was little or no difference found in the boiler efficiency; it was possible to get perfect combustion with both fire-boxes. This can scarcely be urged as an argument in favor of narrow fire-boxes, because it is out of the question to handle locomotives in that way in everyday service. Plainly that boiler is to be preferred which will give the best results with ordinary firing and ordinary attention.

Another point which is worth noting is that even in the engine with 16-ft. tubes the temperatures in the front end were usually between 800 and 900 deg. Fh. which would indicate that the forward part of the flues must be of value as heating surface. It has been generally taken that there is nothing gained by making the tubes longer than 50 diameters, and yet in the wide fire-box engine tested the flues are more than 70 per cent. in excess of this rule, and high smoke-box temperatures were noted. These results would seem to warrant tubes even longer than 16 ft.

These are simply a few of the notable things brought out by these tests which it seems desirable to emphasize.

Legislation in Favor of "Labor" Declared Unconstitutional.

Two recent decisions of the New York Court of Appeals (The People *ex rel.* William J. Rodgers vs. Bird S. Coler, as Comptroller, etc., decided Feb. 26, 1901; and, The People *ex rel.* Ralph J. Treat vs. Same, decided March 8, 1901,) intimating, and by some thought to decide, that the Legislature cannot interfere with home rule in cities as regards their power to contract, have dealt a severe blow to labor legislation. Whether the changes due to aggregations of capital and the more perfect organization of workmen do or do not necessitate governmental control and assistance, there can be no question that the 19th century has witnessed a tendency to regulate trade and business by legislation. As this tendency is ever increasing it is interesting to consider its limitations, chief among which are those imposed by the State and Federal constitutions. Most of such legislation has come before the courts and much of it has been upheld as affecting matters which concern the public health, morals and safety. Factory laws, eight-hour labor laws and building laws are examples of such valid legislation. The statutes declared unconstitutional by the decisions above mentioned (Laws 1897, ch. 415, as amended by laws 1899 chs. 192 and 567; and Laws 1895, ch. 413, re-enacted Laws of 1897, ch. 415, sec. 14) made something of an innovation.

The first of these statutes, known as the "prevailing-rate-of-wages law" was the one before the court in the Rodgers case, and it provided that the wages paid laborers on public works within the State should not be less than the prevailing rate for a day's work in the same trade in the locality in which the work was done; that the terms of the statute should be incorporated in the contract, or it would not be valid, and that for failure to comply with the statute the contractor should forfeit the amount earned. The contractor in the Rodgers case complied with the conditions of the statute in making his contract with the City of New York, but failed to pay his workmen, during its performance, the prevailing rate of wages. The Comptroller of the city thereupon refused to pay him the sums concededly earned by him under the contract. The Court of Appeals has held that the Comptroller was not justified in so acting, and that the provisions in the contract relating to the rate of wages were void.

Much discussion has been provoked by this case and it has given rise to a difference of opinion as to what principle underlies the actual decision and to what extent it will hereafter be followed. It is thought, on the one hand, that the court holds that although the Legislature can regulate the functions of city government in many particulars, yet the present legislation is upon one of those matters where a city is to be treated like an individual. Individuals and private corporations may insert in their contracts any terms, not illegal, as to rate of wages to be paid that they see fit, and in this particular a city may do the same, and the State has no right to limit the city's liberty to contract as it pleases any more than an individual's. Even if this principle of local self-government be the true one, it is not likely to be carried out to its logical conclusion, as it would conflict on all sides with existing adjudications. The court will probably find an escape from applying any such principle to future legislation by hereafter announcing, what is now thought by many to be the true ground of the decision, that as an express provision of the State Constitution (Art. VIII., Sec. 10) prohibits cities from expending their moneys for other than city purposes, the Legislature cannot curtail the city's right to contract in matters calling for the expenditure of city revenues, especially where, as in this case, the contract dictated by the Legislature expends the city's moneys by giving it to individuals instead of paying it out for municipal purposes. The Legislature may not do indirectly what the constitution prohibits a city from doing directly.

To city governments, therefore, the decision and the reasoning of the judges, as indicating their attitude toward future legislation, are of great importance. Judge O'Brien, in the prevailing opinion in the Rodgers case, says: "It is not true that the internal affairs of cities in this State are absolutely subject to the will of the Legislature. . . . If they were, local self-government would be nothing but 'a sham, a delusion and a snare.' . . . The constitution recognizes their existence (cities) as political and corporate

bodies and has imposed various restrictions upon the powers of the Legislature to interfere in matters of local government. It is without power to appoint city officers, though it may provide for their election by the local electors or their appointment by some local authority." It may be true that the *decision* of the Rodgers case goes only so far as to say that the express restrictions of the constitution of New York State upon cities to expend their moneys for none other than city purposes impliedly prohibits the Legislature from curtailing the city's right to contract for compensation to be paid for labor on public works—in other words, gives to cities the liberty to so contract. But the *reasoning* of such decision is very much broader and raises many important questions as to the validity of such acts as the Davis School Law, which contains a section providing for a mandatory appropriation of a certain sum of money for the payment of teachers' salaries after the same have been fixed by local authorities; and so as to all mandatory appropriation bills dealing with city revenues. The recent police bill is open to attack under the reasoning of this case as being subversive of the principle of home rule. No claim was made that the wage law could be supported as legislation affecting the public health or safety. The right of the State as a proprietor of public works to control the same in every particular directly, or through the cities as its agents (see dissenting opinion of Parker, Ch. J.), was the power which was invoked. The question suggested as to future legislation affecting cities is, then, how far will the courts go in *implying* constitutional restrictions upon the power of the Legislature over cities as necessarily incidental to the express provisions of the constitution in their attempt to uphold home rule as a fundamental principle of government? That they will go to great length is at present most clearly intimated.

In line with the Rodgers case Justice O'Brien has collected in his opinion numerous instances where courts of the other States have upheld the general principle of constitutional liberty as affecting the individual in construing statutes which directly or indirectly protected or assisted the laborer at the expense of the *employer's* liberty. It may be well to notice here another kind of interference with liberty of contract for labor, namely, where the *laborer's* liberty has been curtailed. In Garret vs. Taylor (Cro Jac 567), workmen were driven away from plaintiff's quarry by threats of violence, and plaintiff was allowed to recover damages, but as late as 1898 in the case of Allen vs. Flood (L. R. 1898, App. Cas. 1) all of the earlier cases were reviewed, and the House of Lords, overruling the view of the lower courts and of six out of eight of the judges whose opinions were asked, held that where there is no binding contract of employment, no legal right of the workman is violated if his discharge is procured and he is prevented from future employment by threats of strikes. This substantially alters the law in England. Most of our State courts have protected such liberty of contract of both employer and employee. In a number of States, of which New York and New Jersey are examples, the right to combine and strike to better their condition is given to workmen by statute.

In the Treat case the court held unconstitutional the statute which required all stone used on public buildings in New York State to be "dressed" or prepared within the State. The court adopted the reasoning of the Rodgers case, but the true ground of this decision is that such statute is in conflict with the commerce clause of the Federal Constitution.

These decisions have an immediate and important financial effect. The city should save money on its contracts to be awarded in the future, as bids for the work will now be lower, contractors not feeling compelled to make estimates under the wages and dressed-stone laws. The wages of city employees have been raised upon the authority of the wage law, and several millions of dollars have thus been added to the city's current expenses, and this has had a marked effect in raising the tax rate. These salaries can now be reduced, though no one would be so bold as to say that under present conditions any reduction will be made.

To the contractor the benefit is great. The statute acted upon him as a command to agree to pay an indefinite rate of wages practically established by, and liable to be increased from time to time by the labor unions. The union's delegate kept the contractor under his espionage to see that the command of the Legislature was obeyed. For any disobedience a letter was filed with the Comptroller, and he immediately refused to pay the money earned under the contract. The particular set of workmen whom the delegate claimed were underpaid, moreover, immediately began suit against the contractor for the difference of wage between what they had received and what the law called for, and six millions to ten millions of dollars are estimated to have been "held up" in these ways. Many contractors had to stop work until Rodgers determined upon a test case. The contractor now is relieved from an espionage, amounting to virtual blackmail, and from threatened insolvency; and his agreement to pay the "prevailing" wage being invalid, his work will cost him many thousands of dollars less than his "estimate." The city, on the other hand, must pay what it agreed to do for the work, as the statute is not part of its covenant. Contractors for the work upon the East River Bridge, the underground railroad, the Hall of Records, the Public Library, and the work under the Water Supply Department are notably benefited by both decisions. Since the dressed-stone law went into effect, in 1894, the cost of all public work was greatly increased. Stone had to be imported in the rough and rent paid for grounds on which to prepare the same; $300,000 is the estimated saving on the stone for the Hall of Records alone.

The laborer must now seek his consolation in the threatened danger to the contractor which lurks in the taxpayer's future action. Labor unions feel that both decisions are severe blows, but their organizations are blamed for precipitating matters by "pounding" contractors with suits to test the law. The judges are severely criticised, as it is felt that the contractors' gain is unjust and undeserved. The Central Federated Union has started a movement to amend the constitution.

The contractors may yet lose some of the benefit the decisions are supposed to bring them. It is stated that there has lately been argued before the Appellate Division, First Department, the case of Julius Myers, taxpayer, against Lewis Nixon and others, Bridge Commissioners, where the complaint sets forth that the contract made between the Bridge Commissioners and a bidder for some portion of the work on the East River Bridge contains the provisions of both the wage and the dressed-stone laws; that the same are unconstitutional and void; that the contract is therefore illegal and invalid; that it thereby unlawfully increases the cost of the work and for these reasons the performance of the contract should be enjoined and the work relet. This case comes up on demurrer and clearly brings the question of the constitutionality of these acts before the courts. It would seem that the performance of every pending contract made under these two laws stands in danger of being enjoined if this complaint is upheld and the work covered by them relet to bidders whose estimates exclude the expense entailed by such laws.

An Important Railroad Contest in Connecticut.

Thursday, April 4, will come before the Railroad Committee of the Connecticut Legislature the first hearing in the most important railroad contest of the session, a contest of interest outside of the bounds of Connecticut. The question directly involved is the grant by the Legislature to the Connecticut Western of the right of way over 313 ft. of land at Granby Notch, in Connecticut. This strip of land, owned technically by an individual but actually by the New York, New Haven & Hartford Company, now severs the otherwise finished Tariffville branch of the Connecticut Western, and the branch, if completed, would open a new route from the Poughkeepsie Bridge to central and northern New England. While only 313 ft. broad the disputed strip of land is between two high hills, and a new line would entail considerable cost, high grades and a lengthening of the branch line.

The contest dates back to the year 1889, when the Connecticut Western, under an amendment to its charter, secured consent of the Connecticut Railroad Commission to the layout of the branch in the state (the whole branch reaching from Tariffville, Conn., to West Springfield, Mass.,) and to a junction with the Boston & Albany, a total distance of about 15 miles. But at the time the Connecticut Western was in financial straits. The branch was not undertaken, the right of way was only partly secured, and with the expiration of two years, under the railroad law of the state, the right to take land lapsed. An attempt of the company to secure four years ago from the State Legislature the right to issue new bonds to build the branch was contested by the New York, New Haven & Hartford, aided by Hartford interests, which objected to dividing the Connecticut Western terminal with Springfield, and was defeated.

Some two years since the company, having secured funds, began building the branch. It built on either side of Granby Notch, but there the long round of obstructive litigation began. Repeatedly the Connecticut Western has been to the Superior Court of the state, and twice to the Supreme Court, in each case meeting a legal reverse. Once it "jumped" the gap, only to be put back to the old *status quo* by legal decree. In an appeal to the State Railroad Commission it won only so far as to obtain fresh approval of its line and a *pro forma* success, which was nullified later by the Supreme Court, which held that the company was bound by the two-year limitation, which expired nine years ago. The contest now returns to the State Legislature for a final round.

The conflict carries memory back to the time, thirty years ago, when not a few Connecticut towns lent their credit to new railroad enterprises, an evil that reached such a pass that in 1877 it was checked by a constitutional amendment. Hartford had previously subscribed $750,000 to the Connecticut Western, and later saw its investment snuffed out by reorganization, and the lively recollection of that loss and of alleged old pledges that the city should be the "sole terminal" led to the local resistance to the Tariffville branch in 1897, and it still figures actively in the contest. But at present Hartford sentiment divides. Twenty-six of the manufacturing companies of the city, including the largest, aggrieved by alleged impositions of the Consolidated Company, have, through their officers, signed the Connecticut Western petition, as have 322 other business firms; but the City Council has instructed the City Attorney to oppose the bill to permit the branch to be finished, though by a very close vote. Northwestern Connecticut wants the gap bridged, and the rest of Connecticut, outside of Hartford, is apparently passive, with conscientious legislators confused, and those of different quality still in treaty with the lobbies.

In evolving its argument the Consolidated Company urges its own character as a home corporation, and as such entitled to protection against a corporation seeking to benefit Massachusetts; that its adversary is in weak financial condition, and only wants to complete the branch in order to secure a better price in a sale; that coal, which constitutes 50 per cent. of the Connecticut Western's business, owing to heavy grades, can only be carried by that corporation at a loss, and the Legislature has no right to sanction a non-profitable rivalry; and that under the new freighting plan of the Consolidated Company the grievances of Hartford manufacturing companies will be redressed. The Connecticut Western Company, on the other hand, denies the charge of an intended sale; emphasizes the $400,000 already spent on the branch; declares that, now that its property has been "cornered" by the transfer of the New England roads to the consolidated, it has a right to a new outlet and to live; that Northwestern Connecticut has its natural rights as well as the Consolidated Company; and that, on broad grounds of commercial equity, Connecticut cannot with justice deny cheaper coal to Massachusetts.

There are two other aspects of the conflict worth brief note. One is the fact, perhaps now published for the first time, that the late President Clark, of the Consolidated Railroad Company, a few months before his retirement from the Presidency, was offered the Poughkeepsie Bridge system, strongly favored taking it, and, although supported by Vice-President Hall (now President) was overruled by the other members of the Executive Committee of the Consolidated directorate. President Clark, as he stated at the time, wished the system merely for the value of the bridge as a connecting link for Western business of the New England road (now the Highland Division of the Consolidated System). Time and the present contest are, perhaps, vindicating the wisdom of President Clark's view. In yet another and broader aspect the conflict, should the Connecticut Western win, opens up some interesting if not imperative questions bearing on future relations of the Consolidated with the New York Central. The contract of these two companies—dating back to the days of Commodore Vanderbilt and recently revised—for the use of tracks and terminals at New York city contains some sweeping and exclusive provisions against the supplying of business to rival roads; and the Connecticut Western, as a rival of the Consolidated, may, by its Tariffville branch, become a germ of complications as a connection of the Boston & Albany, now held by the New York Central as lessee. In the existing doubts as to whether railroad destiny points to the New York Central or the Pennsylvania as the future master of the Consolidated, the contest over the Tariffville branch has its speculative place.

A press despatch from Chicago says that the general passenger agents of three lines which belong to the Western Passenger Association have protested against the practice of attaching passenger coaches and sleepers to fast mail trains. It is alleged that this practice is followed by some of the stronger lines, and "the weaker lines demand that it be stopped." That is a protest which, we guess, will not be very seriously considered. If it should be considered seriously we should infer that the seriousness was put on for the purpose of concealing a feeling of contempt. What are powerful passenger locomotives made for but to make it possible to add weight to trains without sacrificing speed? After spending hundreds of thousands of dollars in this way, a railroad having the men and facilities to economically carry passengers five times a day will not be likely to content itself with four passenger trains a day, unless its competitors are very slow. There is reason in trying to get your powerful competitor to refrain from running unnecessary trains, and thereby diminishing his own profit while destroying yours; but to object to the addition of a car or two to a train which must be run anyhow is a little too much. It is too easy a way by which to please passengers to be lightly abandoned by the traffic manager who has tried it.

The Meeting of the Maintenance of Way Association.

(*Continued from page 223.*)

ter thoroughly now. We expect to work on it, and at the next meeting to make a definite recommendation. We will have to co-operate with the rail makers. In regard to taking it up with the American Society of Civil Engineers I do not know whether we are in shape to do that or not.

In regard to the carbon I agree with Col. Prout that probably we can with this heat treatment use a little higher carbon than we have been and also improve the quality of the rail. In regard to the wear it is only within the past two or three years that they have been taking this matter up in a scientific way. On our own lines now we have rails marked as Col. Prout has indicated, and at regular intervals we expect to take the sections of the rail to show how it wears from year to year. In addition to the instrument mentioned by Col. Prout there is an instrument of German manufacture which I first saw at the Carnegie Steel Co. They have inspectors they send out to caliper the sections, and they have an instrument which calipers the entire head, and it is clear to me that this would give us better results than the instrument spoken of by Col. Prout. It is a little difficult to manipulate. You have to fasten it to the rail, and you have to send out flags, because it would be disastrous to the instrument if a train would strike while it was on the rail. It is of such a nature that it cannot be taken off in a second or two. But it is an instrument that would give very good results, and by identifying the rails and then going through them once in six months you will be able to get some definite results as to your high carbon rails, your low carbon rails, or your rails at a low temperature or rails of other kinds that you may be experimenting with.

Mr. McKenna—Our experience in the re-rolling of old rails goes back about five years. We went on and established our plant at Joliet and later one at Kansas City, and we are now building one on New York Bay. We have already made about 100,000 tons of rails, and the experience of our customers with rails seems to have been very happy, because they all speak very well of them, and in almost every instance have come back for more work. The practical feature of our method is simply heating a full length of rail in a furnace 12 x 34 ft. to a temperature of 700 deg., when the rails are drawn from the furnace. They have three passes—the upsetting pass, the roughing pass and the finishing pass. The rails are finished to 1,480 deg., which is a higher heat than I expect to use. I expect to finish at 1,400. The manner of heating these rails we found to be expensive before we devised a furnace that would give us an equable heat, but we early overcame that disadvantage, and now we are finishing the rails at a perfectly uniform heat. The reduction of section has been as low as 6 per cent. and as high as 10, the average being about 8. In many instances the rails are drawn out to 32 ft.; instead of cutting them off at a standard length we are reducing that 2 ft. Those are the principal features connected with it.

The heaviest section we have rolled is 80 lbs. The life of a rail is not measured by one life. It is measured by the number of times it can be rolled. This section that we are discussing will have advantages in rerolling which I consider quite as great as making the original rail at a low temperature. All our experiments in the way of chemical tests show that there is no disturbance of the chemical property of the rail, and the experiments that we have made at various times all show a very considerable improvement in the structure. The physical wear of these rails shows that they have been uniformly improved in quality.

(TO BE CONTINUED.)

Production of Bessemer Steel Ingots and Rails in the United States in 1900.

We present below statistics, received direct from the manufacturers, of the production of Bessemer steel ingots and castings and Bessemer steel rails in the United States in 1900. Our ingot statistics below include the production of a few thousand tons of Bessemer steel castings.

Ingots.—The production of Bessemer steel ingots in 1900 was 6,684,770 gross tons, against 7,586,354 tons in 1899. The production of 1899 was the largest in our history, but it may be equaled in a year or two, although open-hearth steel is proving to be a most formidable rival of Bessemer steel. The following table gives in gross tons our production of Bessemer steel ingots, including steel castings, in the last six years. Of the production last year 6,467 tons were steel castings, against a similar production in 1899 of 3,939 tons.

	Ingots.		Ingots.
1895	4,909,128	1898	6,609,017
1896	3,919,906	1899	7,586,354
1897	5,475,315	1900	6,684,770

There were no Clapp-Griffiths works in operation in 1900 and only one Robert-Bessemer plant was active. Seven Tropenas plants were at work in that year, and all were employed in the production of steel castings.

Rails.—The production of all kinds of Bessemer steel rails in 1900 was 2,361,921 gross tons, against a similar production in 1899 of 2,240,767 tons and 1,955,427 tons in 1898. The following table shows the production in gross tons of Bessemer steel rails in the last four years. The figures given do not include a very small quantity of rails made each year from purchased blooms or rerolled steel rails, statistics for both of which products for 1900 are not yet available.

	1897.	1898.	1899.	1900.
Pennsylvania	1,024,386	1,052,771	1,224,807	1,195,255
Other States	590,013	902,656	1,015,960	1,166,666
Total	1,614,399	1,955,427	2,240,767	2,361,921

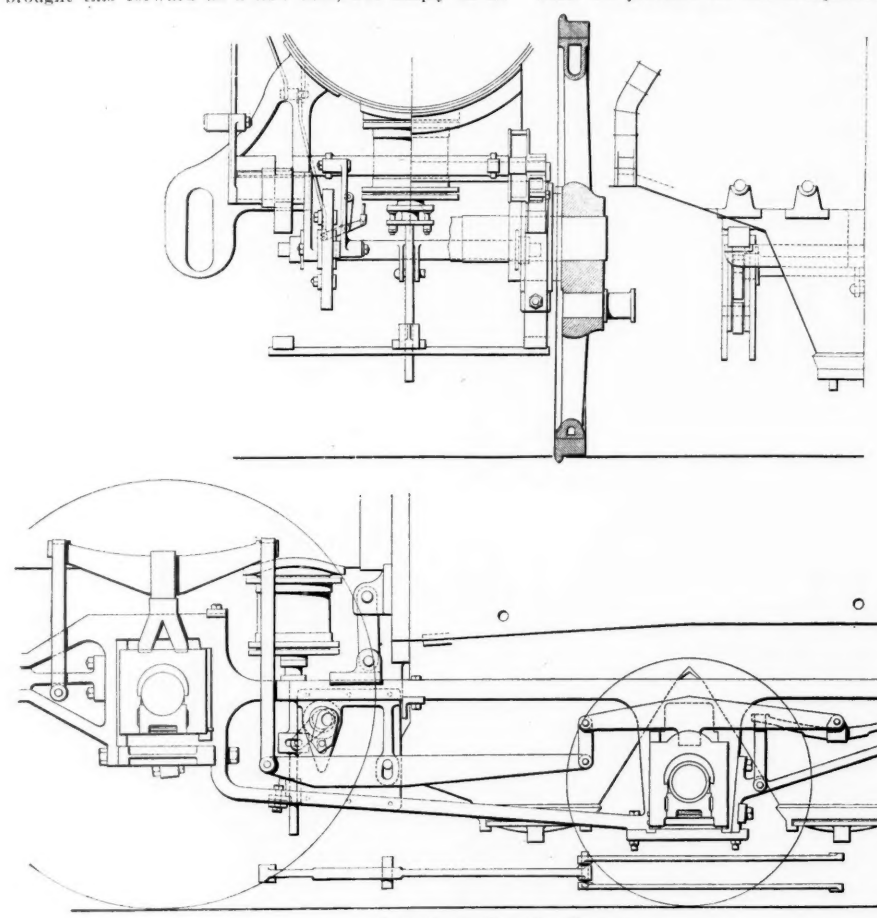
At the request of the manufacturers we separated for 1897, for the first time, the production of Bessemer steel rails weighing 45 lbs. and less than 85 lbs. to the yard from those weighing less than 45 lbs. and over 85 lbs. This separation we continue for 1900, as follows, also in gross tons:

	Under 45 lbs.	45 lbs. and less than 85.	85 lbs. and over.	Total.
Pennsylvania	82,161	784,976	328,118	1,195,255
Other States	72,635	820,091	273,940	1,166,666
Total	154,796	1,605,067	602,058	2,361,921

The total production of rails in 1900 will include rails made from open-hearth steel and iron rails. When all the figures are collected it will probably be found that our total production of all kinds of rails in 1900 was about 2,400,000 tons.—*The Bulletin.*

Locomotive Traction Increasers.

In our issue of Feb. 1, page 72, appeared a description of the new Class I "Central-Atlantic" type locomotive of the New York Central Railroad, one of the peculiar features of which, it will be remembered, is an arrangement by which a part of the weight normally carried by the trailing wheels and by the truck wheels may be transferred to the driving wheels. Some of our contemporaries which have reprinted the description (not always giving credit we regret to say) have been particularly attracted by the traction increasing attachment, but those who read the article in the original could not have been misled into supposing that we brought this forward as a new idea, but simply as an interesting and possibly important revival of something that had been tried before at home and abroad.



A Baldwin Traction Increaser.

The engravings published herewith show a traction increasing arrangement which was patented in 1880 by Mr. William P. Henszey (of Burnham, Williams & Co.), and applied to engine No. 5,000 of the Baldwin Locomotive Works. Even this design had been anticipated by Mr. Mathias Baldwin in 1848 on the "Governor Paine," built for the Central Vermont Railroad.

TECHNICAL.

Manufacturing and Business.

The Pressed Steel Car Co. is establishing a new record so far as daily ouput is concerned. During the week ending March 16, the company built and equipped 636 freight cars, a daily average of 106 cars. The shipments consisted of 467 hopper cars and 169 box cars.

The Chicago Pneumatic Tool Co., Chicago, report that for the first 15 days of the current month they received 600 orders, many orders covering a line of pneumatic tools for different purposes. This showing is about 25 per cent. increase over the business heretofore received for the same period.

The American dust guard, made by the American Dust Guard Co., Columbus, Ohio, has been specified for the 1,500 cars of 80,000 lbs. capacity being built by the Pullman Co. for the Hocking Valley R. R., and on the 1,200 cars of 60,000 lbs. capacity and 800 cars of 80,000 lbs. capacity being built by the American Car & Foundry Co. for the Missouri, Kansas & Texas R. R.

The Case Mfg. Co., Columbus, Ohio, has just been awarded the following contracts: One 15-ton 50-ft. span electric traveling crane, James Leffel & Co., Springfield, Ohio; two one-ton electric traveling cranes, Henry D. Perky, Niagara Falls, N. Y.; one 25-ton electric traveling crane, U. S. Cast Iron Pipe & Foundry Co.; and one three-ton three-motor electric traveling crane for the Wm. R. Trigg Co., of Richmond, Va.

Simplex bolsters, made by the Simplex Railway Appliance Co., Hammond, Ind., will be used on the 2,000 cars recently ordered by the Michigan Central from the American Car & Foundry Co.; on the 600 cars for the Wheeling & Lake Erie and the 400 stock cars for the Northern Pacific, to be built by the South Baltimore Car Works; and on the 250 cars for the Louisville & Nashville to be built at the shops of the road.

Iron and Steel.

The Chicago & Alton has contracted for 4,000 tons bridge work with the American Bridge Co.

The Berlin Construction Co., of Berlin, Conn., has leased the Pottsville Bridge Works of Pottsville, Pa.

W. G. Park has resigned as Chairman of the Executive Committee of the Crucible Steel Co. of America.

Albert L. Schultz, heretofore head of the Contract Department of the American Bridge Co. in Pittsburgh, Pa., has been appointed Manager of all the departments of the company in the Pittsburgh District, succeeding James P. Kennedy, resigned.

The plan for the reorganization of the Diamond State Steel Co. provides for the incorporation of a new company of the same name with securities as follows: $2,225,000 7 per cent. preferred, and $2,000,000 common stock; also $1,000,000 4 per cent. first mortgage bonds.

The American Bridge Co. within the past few days has received a contract for 20,000 tons of bridges for the Guayaquil & Quito R. R. Co. in Equador, and a large group of buildings for the Cananea Consolidated Copper & Silver Mining Company of Mexico, and also several large contracts for manufacturing buildings to be shipped to Australia, and a large railroad bridge to go to the Sandwich Islands. It is also announced that their tender for a large foreign contract exceeding in size anything which they have taken has been accepted, and that one of their engineers sailed this week to consummate the arrangements.

Pennsylvania Class E-2 Locomotives.

During the coming summer there will be a number of Class E-2, modified Atlantic type, locomotives built at the Juniata shops of the Pennsylvania Railroad. This design was illustrated and described in the *Railroad Gazette*, July 20, page 492, and was there referred to as an experimental design. On page 605, Sept. 14, we noted further the completion of the first and only engine of this class. The boiler pressure was 185 lbs. We are informed that our description of July 20 will suffice for the new engines that are to be built, and that the de-

sign has been modified but slightly in minor detail; while the working steam pressure has been raised to 205 lbs.

Water Purification.

The Wefugo Company has recently secured orders for thirteen water-softening plants. The rated capacities of the plants per 24 hours aggregate 3,000,000 gallons. The company has a total daily rated capacity now of water-softening plants in service of over ten million gallons for boiler-feeding purposes.

The New Shops of the Chicago & Alton.

The Chicago & Alton has built, at Bloomington, Ill., a new powerhouse and wheel and axle shop, extended the coach shop, the coach paint shop, and the engine house, made changes in cranes, is erecting a riveting tower and new cranes in connection therewith in boiler shop, has installed new boilers and is installing new engines, dynamos, etc. The work will soon be completed.

Automatic Block Signals on the Lehigh Valley.

Officers of the Lehigh Valley announce that the equipment of the main line of that road from Jersey City to Buffalo, 448 miles, with automatic block signals, will be finished by June 1. This means an addition of about 75 miles of line, double track, to the mileage heretofore reported in the *Railroad Gazette*. The Hall Signal Company, which has furnished and put up all of the automatic signals on this road, is now at work on its contract from Van Etten Junction to Manchester; the new contract, the final one for the main line, covers the road from Manchester, N. Y., westward to Depew. The sections are now worked by the manual block system. From Depew westward the line is already signaled. All of the signals now to be erected, and all which have been put up within the last year, are semaphores, worked by electric motors. Every block section has a distant signal. The Lehigh Valley will thus be the first trunk line to have automatic signals throughout the whole of its main line.

Composite Board.

The Composite Board Company, recently incorporated and organized under the laws of the State of New York, having acquired the patents, plant and business of the Ornamite Veneer Co., has established an office at 26 Cortlandt street, New York. Various classes of material are produced by this company. The board, at present known as "Ornamite," is made from wood pulp in any desired thickness, generally ⅜ in. For head lining of coaches, three thicknesses of board are used, the chemical treatment it receives rendering it water-proof, and the material, having no grain, will neither split, check nor crack. This product is being used extensively by railroads. It has also been applied to coaches and baggage cars as outside sheathing. The board, being 40 per cent. lighter than wood, with equal strength, is specially adapted to use for electric cars. Another important field for its use will be in marine work, as it can be made non-inflammable, and in any desired color or shape. The material, being capable of a high finish, and susceptible to molding in almost any shape, is well adapted to use for bodies of fine carriages. Excellent imitations of various woods are produced from the board. The capacity of the present plant at Watertown, N. Y., has already proved inadequate to the business, and the company will soon move its machinery to Fulton, N. Y., where two larger mills will be occupied and new machinery added, thereby largely increasing its capacity.

The officers of the company are: President, Edward Hill; Vice-President and General Manager, W. S. Huntington (patentee); Secretary, Jas. D. Layng, Jr.; Treasurer, J. H. Winters.

THE SCRAP HEAP.

Notes.

Several enginemen recently discharged from the service of the Chicago, Burlington & Quincy allege that they were dismissed because they joined the Brotherhood of Locomotive Engineers or Firemen.

The Birmingham *Herald* prints a list, filling a column, of employees on the Louisville & Nashville, who, according to the Annual Honor Bulletin No. 5, issued by the Assistant Superintendent, have made clear records for the 12 months ending Feb. 3. This list contains names of engineers, conductors, flagmen, brakemen, firemen, hostlers, train baggagemen, train porters, assistant yard masters, yard foremen, switchmen, "joint agents and operators" and section foremen.

According to New Orleans papers the Illinois Central has given to its employees in that city (and presumably everywhere) bronze medals commemorating the 50th anniversary of the organization of the railroad company. The name of the employee and a number indicating his length of service are engraved on the medal. Mr. R. S. Charles has been local Treasurer at New Orleans since 1853, and a number of other employees have served very long periods. About 3,000 medals were distributed in New Orleans.

The Legislature of South Carolina has passed three laws affecting railroads. Section 615 of the Revised Statutes is amended so that railroads, whether wholly within or partly without the state, may merge with other roads with which they connect directly or indirectly. The law contains a proviso intended to maintain in force the constitutional prohibition against consolidation of parallel competing roads. Another act enlarges the power of the Railroad Commissioners over passenger train schedules. Heretofore the board could order a passenger train to be run each way daily. Now it may require "facilities" for two journeys each way daily, the term "facilities" being evidently meant to include freight cabooses for the second journey. The law regulating railroad traffic on Sunday has been amended so that the Commission may, on the application of the officers of a church, run a train on Sunday to carry passengers to religious meetings.

Traffic Notes.

San Francisco despatches announce that the Southern Pacific has discontinued giving low through rates from Eastern cities to Honolulu. This action follows a protest on the part of San Francisco wholesale merchants.

The Grand Trunk announces that early the coming summer a new fast express train will be put on to run between Chicago and New York, starting, in each direction, in the morning. East of Buffalo these trains will be run over the Lehigh Valley.

The Supreme Court of Michigan sustains the ruling of Commissioner Osborn that the earnings of the Wabash Railroad in Michigan exceeded $3,000 per mile last year, and that the company must therefore reduce its passenger fares in Michigan to 2 cents a mile. The court holds that in determining what the domestic fares shall be it is competent to include the amount of interstate fares earned by that portion of the road lying within the state.

The Interstate Commerce Commission held an investigation at Kansas City March 21 and 22 concerning irregularities in rates on grain to the Atlantic seaboard. The press despatches would seem to indicate that not much evidence of value was secured; but the hearing is likely to be continued hereafter, as a number of witnesses who were wanted could not be found. The reporters think that the prosecuting officer has evidence that shipments billed to the Atlantic seaboard at export rates are stopped off for domestic consumers and delivered at rates less than those which are legal for domestic shipments.

Technical Schools.

Purdue University.—The annual inspection trip of students of Purdue University left Lafayette on the morning of March 25 and is due to reach Lafayette on the return at noon of March 29. The party is accompanied by Prof. Goss, Dean of the Engineering Faculty, and will be divided into four sections. The mechanical engineering inspection will be conducted by Prof. Miller, the electrical engineering by Prof. Goldsboro, civil engineering by Prof. Pence and the technical chemistry by Mr. W. H. Test. The programme includes a banquet given by the Chicago Alumni at the Chicago Athletic Association. The mechanical engineers will visit a number of railroad shops, factories and power plants in and about Chicago. The electrical engineers will visit the plants of the elevated and surface railroads and a number of private installations, as well as the Chicago & Northwestern Railroad shops. The civil engineers will visit the Chicago & Northwestern shops, the Burnside shops of the Illinois Central, the Pullman Works, the South Chicago Works of the Illinois Steel Company, the American Bridge Company's Works, the Engineer's office of the Chicago, Burlington & Quincy and a number of municipal and private works. The chemistry section will visit the Fairbanks Works, the Armour Soap Works, gas works, Frazier & Chalmers, the Illinois Steel Company, the Standard Oil Company's Works at Whiting and other places.

University of Illinois.—The senior class of the Mechanical Engineering Department of the University of Illinois visited Chicago on an inspection trip from March 14 to 23. Train resistance tests with the new dynamometer car, owned jointly by the Illinois Central and the University, were made in going to and from Chicago. While in Chicago visits of inspection were made to the Pullman car shops, Illinois Central shops at Burnside, the new power station of the South Side Elevated, the Illinois Steel Works, some of the larger lighting plants of the Edison Company and a number of large manufacturing shops.

The Commissioner of Patents.

The President has appointed Mr. F. J. Allen, of Auburn, N. Y., Commissioner of Patents, to succeed Mr. Duell, whose resignation we recently noted. Mr. Allen is a patent lawyer of large experience.

Rogers Locomotive Works.

The newspapers announce in a very vague way the sale of the Rogers Locomotive Works, but do not give the names of the buyers or the price. It is said to be the plan of the purchasers to greatly increase the size and capacity of the works.

Opening of Hudson River Navigation.

The opening of the Hudson as far as Troy is a little earlier this year than last. Last year it was not until April that the boats of the Citizens' Steamboat Company made their first trip. This year the first trip was made March 25. The steamers of the Albany Evening Line, the Adirondack and the Dean Richmond resume their night trips to Albany on Monday next. The Catskill, Hudson and Coxsackie boats and the Central Hudson boats for Newburgh are already running, as well as the "Homer Ramsdell," which runs to the lower Hudson River towns. Navigation for them has been open for some time.

Fire at Schenectady.

The hammer shop of the Schenectady Locomotive Works, a frame building 60 by about 250 ft., was destroyed by fire Saturday, the 23d. The building and contents were insured in the Manufacturers' Mutual Insurance Company of New England, who adjusted the loss the following Monday, and contract was immediately made for a new building 85 x 365 ft., to be built of steel and brick. Meanwhile the old building will be patched up, so that several of the hammers can be started into service this week temporarily, and with contracts let with outside forges for shapes it is expected that the work of the Schenectady Locomotive Works will not be seriously interfered with by the fire.

A Good Record in Engine Repairs.

Santa Fe 10-wheel passenger engine No. 822, cylinders 19½ in. x 28 in., old Class B-13 (see *Railroad Gazette*, Jan. 18, 1901), running between Pueblo and Denver, was sent to Raton, N. Mex., shops, for medium heavy repairs, reaching the shops Jan. 27 at noon. The engine was taken in hand by General Foreman William Thompson, and the following work was complete at noon Feb. 1—five days: Tires were turned; pedestal jaws dressed; Babbitt bearings put in all driving-boxes and some new brasses there; all rod brasses renewed; cylinders bored and new pistons and crossheads supplied; three patches put in the firebox; new flues put in; almost the entire spring rigging renewed; valves faced and set, and guides lined up; brake rigging overhauled and a new stack put on. The engine was reported ready for service by Master Mechanic C. M. Taylor on the date given and was put on a regular train, without preliminary run, and went through to La Junta over the mountain without heating a journal. The direct shop work was in charge of Foreman Frank C. Farquharson, and the pit work was in charge of Mr. John Daugherty.

New Passenger Cars for Texas Midland.

On Friday afternoon, March 15, the Texas Midland exhibited a fine new passenger train at the Union Station, St. Louis, Mo. The cars of this train were built by the American Car & Foundry Co., and the notable special equipment includes Westinghouse high-speed brakes, Westinghouse friction draft gear, automatic air and steam pipe couplers and American automatic slack adjusters. The cars are lighted by acetylene gas, the generators and other lighting apparatus being furnished by the Adams & Westlake Co.

Heat and Gases in Cascade Tunnel.

A serious difficulty confronts the operating department of the Great Northern Railway in running trains through the Cascade tunnel, which was completed and opened for traffic about Dec. 15. The tunnel is 13,500 ft. long, and is hot at all times. There is a strong current of air sweeping through it from west to east at all times, and this causes the smoke and gases from the locomotives going in that direction to be carried along with the train, with the result that it overcomes the engineers and trainmen. The results are in some cases dangerous. Going east the tunnel runs on a heavy upgrade of 90 ft. to the mile, which makes it necessary to pull the freight trains through with two and sometimes with three engines, and this increases the danger. Fully a score of engineers have at different times been taken from their engines unconscious. This condition will necessarily hasten the equipment of the tunnel with appliances for operating it by electricity, as was originally planned by the company. When this is done it is the present plan of the company to propel trains by electric engines from Skykomish, on the west side of the mountains, to Davenport, on the east side, a distance of 75 miles. The power for the motors will be generated at the west end of the tunnel.—*New York Commercial.*

Big Exhaust Heads.

Two of the largest exhaust heads in the country, one 30-in. and one 36-in., were recently installed by the Edison Electric Illuminating Co., of Boston, Mass., in their new station. They are of the Sturtevant centrifugal type.

Steel by Electricity in Sweden.

Consul Nelson, of Bergen, under date of Jan 30, 1901, reports a successful attempt to produce steel by electricity in Sweden. The Consul says: "The experiments are being carried on at Gysinge factory, Sweden, and about 25,000 lbs. of steel are produced in six drafts daily. The profits are large, but, as the electrical power is limited, the output is insignificant. Plans have been formed for a large electric plant near the Dalalfuen River, the water power of which will be utilized. This will enable the company to carry on the manufacture of steel by electricity on a large scale."

Steel for Cutters.

Consul-General Guenther, of Frankfort, Feb. 4, 1901, notes that German papers are discussing an expected revolution in machine tools on account of the use of "Böhler's rapid" steel. New machine tools have been ordered by many German establishments, those new in use being of too light construction to meet the increased cutting speed of the new steel.

Interstate Commerce Commission.

The Sundry Civil Appropriation bill, as finally passed by Congress, carries an appropriation for salaries and other expenses of the Interstate Commerce Commission of $250,000; and "to enable the Interstate Commerce Commission to keep informed regarding compliance with the 'Act to promote the safety of employees and travelers upon railroads' and to enforce the requirements of said act, $25,000."

Illuminating Niagara Falls.

If the present plans are carried out the Falls of Niagara will be illuminated by searchlights during the coming summer. For several years the Michigan Central Railroad has contemplated the illumination of the cataract, but never until very recently have definite steps been taken with that end in view. On March 12 officials gathered at the Falls to witness tests of illumination. The searchlight was installed in a car, together with a generator and a small engine. This engine was connected to the locomotive in order to get steam. The apparatus worked satisfactorily. The projector was of the 30-in. type. It is possible that a 36-in. projector will be used in order that the full crest of the Horseshoe may be covered by the light beam at the same time.—*Electrical World.*

LOCOMOTIVE BUILDING.

The Southern Pacific is about to order 60 locomotives.

The International & Great Northern is in the market for 10 locomotives.

The Sobral, of Brazil, has ordered two engines from the Baldwin Locomotive Works.

The Norfolk & Western has ordered 10 engines from the Richmond Locomotive Works.

The White Pass & Yukon has ordered two engines built by the Baldwin Locomotive Works.

The Texas & Pacific has ordered 25 locomotives from the Cooke Locomotive & Machine Works.

The Lehigh Valley has ordered 15 locomotives from the Baldwin Locomotive Works, for June and July delivery.

The Toledo & Ohio Central has ordered three eight-wheel simple engines, for October delivery, from the Brooks Locomotive Works. They will weigh 128,000 lbs. with 84,000 lbs. on the driving wheels and have 18-in. x 26-in. cylinders; 72-in. driving wheels; wagon top boilers, with a working steam pressure of 180 lbs. and 301 tubes, 2 in. in diam. and 11 ft. 7 1-16 in. long; fire-boxes, 108 in. long and 42 in. wide; and a tender capacity for 5,000 gals. of water and 10 tons of coal. The specifications in-

clude American steel bolsters, Westinghouse brakes, Tower couplers, Ohio injectors, Jerome metallic packing, Star Brass safety valves, Detroit lubricators, French springs and Keasbey & Mattison lagging.

CAR BUILDING.

The Wabash is reported in the market for a large number of cars.

The Colorado & Southern has ordered two baggage cars from the Pullman Co.

The Texas & Pacific is in the market for 1,000 box cars of 60,000 lbs. capacity.

The Lehigh Valley is reported in the market for from 1,000 to 2,000 coal cars.

Dolese & Shephard, Chicago, are reported in the market for a few gondola cars.

The Chesapeake & Ohio is now reported in the market for from 500 to 1,000 coal cars.

The Duluth, South Shore & Atlantic is in the market for 150 coal cars of 60,000 lbs. capacity.

The Kansas City, Fort Scott & Memphis is in the market for 150 coal cars of 60,000 lbs. capacity.

The Colorado & Southern has ordered 400 coal cars of 60,000 lbs. capacity from the Pullman Company.

The International & Great Northern is in the market for 11 chair, eight combination and three baggage cars, and is reported in the market for 1,500 box cars.

The Northern Pacific has ordered 150 stock cars from the South Baltimore Car Works, in addition to the 450 recently ordered.

The Missouri Pacific has ordered 2,500 box cars of 60,000 lbs. capacity from the American Car & Foundry Co. McCord journal boxes will be used.

The St. Louis & Southwestern has ordered nine cars for passenger service from the American Car & Foundry Co. They will be built at the Jeffersonville works.

The Middletown Car Works are building four flat and eight gondola cars for service in Mexico. The same works have recently furnished 20 gondola cars with steel underframes for a road in Argentine Republic.

The Columbus, London & Springfield (Electric) has ordered 10 passenger cars from the Barney & Smith Car Co., for delivery between September and January next. They will measure 61 ft. 2 in. long, 8 ft. 6 in. wide and 13 ft. high, and will have General Electric equipment, air-brakes and steel-tired wheels.

The Peoria & Pekin Union has ordered 75 coal cars of 80,000 lbs. capacity, for June delivery, from the American Car & Foundry Co. They will measure 36 ft. 5 in. long and 8 ft. 11½ in. wide. The special equipment includes Sterlingworth brake-beams, Gould couplers and draft rigging and American steel trucks.

The Michigan Central order with the American Car & Foundry Co., mentioned in our issue of March 8, calls for 1,500 box cars of 80,000 lbs. capacity and 500 furniture cars of 60,000 lbs. capacity, all for June and July delivery. The box cars will measure 35 ft. long and the furniture cars 45 ft. long. The special equipment includes Simplex bolsters, Westinghouse brakes. Magnas brasses, Detroit couplers, Security and Jones doors, Gould draft rigging on box and Thornburg on furniture cars, McCord journal boxes and box lids, Hutchins metal roofs and Detroit springs.

BRIDGE BUILDING.

Aberdeen, S. Dak.—It is stated that bids are wanted, April 3, for four 45-ft. steel span bridges for Brown County. Address the County Auditor.

Albany, N. Y.—It is said that the New York Central & Hudson River R. R. will soon let a contract for a highway bridge to carry Watervliet avenue over the freight yards at West Albany.

Bethlehem, Pa.—The County Commissioners of Lehigh and Northampton counties decided to replace the bridge at Main street over Monocacy River.

Boise, Idaho.—Bids will be opened, April 15, for a bridge proposed over Boise River near this city. W. M. Clark, Chairman of the Board of County Commissioners.

Boston, Mass.—A bill is before the Legislature authorizing the Metropolitan Park Commissioners to build a bridge over Mystic River between Bedford and Somerville, at a cost of $250,000, one-half to be paid by the Park Commission and the other half by the communities interested.

Bout de L'Ile, Que.—The directors of the Chateaugay & Northern Ry. will soon want bids for its large railroad and highway bridge over River Des Prairies between Bout de L'Ile and Charlemange.

Bridgeport, Conn.—It is stated that bids will probably be wanted about April 1 for building the Yellow Mill bridge. H. G. Scofield, City Engineer.

Buffalo, N. Y.—The bill for building the bridge over Niagara River from the American side to Grand Island has been extended by Congress for three years. The act also permits Grand Island and the County of Erie to issue bonds for building the bridge.

Canton, S. Dak.—Bids are wanted, April 2, for two 60-ft. steel bridges. J. Minot, County Auditor.

Cincinnati, Ohio.—Bids are wanted, April 6, for $50,000 bonds for bridge repairs. Geo. F. Holmes, Clerk Board of Public Service.

Columbus, Ohio.—On March 14 the County Commissioners let contracts for the Hibernia bridge over Big Walnut; Reynoldsburg bridge over Black Lick Creek; the Milburn bridge and the Hibernia arch culvert.

Dubuque, Iowa.—The City Council has appropriated $25,000 toward the Eagle Point bridge proposed by the Dubuque & Wisconsin Bridge Co. C. H. Mayer, Secretary of the bridge company.

Fort Laramie, Wyo.—A new bridge will be built over the Laramie River at Fort Laramie this year. A bridge will also be built at Torrington.

Henderson, Ky.—The Louisville & Nashville will build a new bridge approach and union station at a cost of about $250,000. The ordinance has passed a second reading in the Council.

Indianapolis, Ind.—The Marion County Council, on March 19, made appropriations for a number of small bridges.

Plans for the new bridges across White River at West Washington street and River avenue have been finished. The old bridges are condemned. The City Engineer reports that Melan arch bridges would cost the city about $125,000 each.

Kalama, Wash.—The Northern Pacific contemplates building a steel bridge over the Columbia River between Kalama, Wash., and Goble, Ore., which will be a very costly structure.

Kansas City, Mo.—It is stated that the Kansas City Belt Ry. is preparing to build its proposed new steel bridge at McGee street, which will cost about $15,000.

Lexington, Mass.—The Selectmen of this town are considering abolishing the grade crossings of the Boston & Maine at Woburn, Grant, Merriam, Hancock, Revere and Bedford streets.

Lisbon, Portugal.—The Portuguese Government has authorized the building of two iron or steel bridges over River Douro. Address the Director of Public Works and Mines at Lisbon.

Los Angeles, Cal.—The Southern California Ry. is preparing to build a steel bridge over Los Angeles River above Buena Vista street, to replace a wooden structure. It will cost about $114,200.

Missoula, Mont.—It is stated that plans are being considered by the city and county to build a bridge over the Missoula River above the present structure.

Montreal, Que.—The City Council of St. Henry has passed a bill providing for a bond issue of $200,000 for a tunnel under the Grand Trunk tracks at St. Jean street, and another at St. Elizabeth street.

Muscatine, Iowa.—Proposals will be received at the office of the Auditor of Muscatine County, until April 3, for all iron bridges needed by the county for the ensuing year. Spans from 20 to 80 ft. in length delivered f. o. b. at railroad station.

New York, N. Y.—The State Senate has favorably reported the bill providing for a bridge across Jerome Park reservoir from Jerome avenue to Sedgwick avenue.

The Assembly has passed the bill authorizing the New York City Highway Commissioner to build or extend the bridges, viaducts or tunnels across the depressed tracks of the New York & Harlem Railroad at the Gun Hill Road, at East 149th street and at East 161st street, and across the tracks of the Spuyten Duyvil & Port Morris Branch of the New York Central & Hudson River Railroad at Mott avenue, Elton avenue, and Washington avenue in the Borough of the Bronx, by increasing the widths and otherwise modifying or changing them so as to make them conform to the legally established widths and grades of the thoroughfares.

The bids received on March 11 for building the tower foundations on the Brooklyn side of the East River for East River bridge No. 3 have been rejected because of the recent decision in the matter of the labor laws. The proposals submitted averaged about $800,000.

Northfield, Mass.—The Selectmen are authorized to make an agreement with the Central Vermont toward building a new bridge in place of the present railroad bridge.

Quebec, Que.—The Quebec & Lake St. John Ry. will build a steel bridge about 500 ft. long at Valcartier.

Reading, Pa.—The Berks County Grand Jury has recommended a new county bridge over the Schuylkill River at Sixth street.

Sealed proposals are wanted for the steel superstructure for a bridge across Mill Creek at Fetherolfsville, Albany Township. Frank H. Moyer, County Commissioner. W. R. Kemmerer, Clerk.

St. Jacobs, Ont.—Bids are wanted, April 2, according to report, for a 172-ft. steel bridge over Conestogo River. Herbert Bowman, Consulting Engineer, Berlin, Ont.

St. Paul, Minn.—The Chicago, Milwaukee & St. Paul contemplates the renewal of the small bridges on the Southern Minnesota line this year.

Sparta Wis.—Fred. A. Holden, County Surveyor, informs us that five iron or steel bridges are proposed to be built in the county this spring. The prices range from $350 to $1,000. They are located in Jefferson, Byron, Oakdale, Wilton and Tomah.

Spokane, Wash.—Plans and specifications are finished for the changes to be made on the south end of Monroe street bridge at a cost of $16,000.

Stafford, N. Y.—The Town Board is considering the proposition from the New York Central & Hudson River Railroad to build an overhead bridge at Gardener's Crossing.

Sultan, Wash.—The County Commissioners have been asked to appropriate $12,000 for a bridge across the Skykomish River.

Troy, N. Y.—A hearing was given last week before Col. J. W. Barlow, Corps of Engineers, U. S. A., on the removal of the piers of the Delaware & Hudson bridge across the Hudson River at Troy.

Washington, D. C.—General Wilson, Chief of Engineers U. S. Army, has appointed a board consisting of Lieut.-Col. Charles J. Allen, Capt. Edward Burr, Capt. L. H. Beach and Lieut. George M. Hoffman, to consider the subject of a new bridge across the Potomac River on practically the same line as the present Long bridge and for railroad purposes only in accordance with the act providing for track elevation and new terminals for the Baltimore & Potomac R. R. noted in our issue of Feb. 22, p. 130. The Board is to convene at Washington April 3. The Act provides for removing the Long bridge and building a new drawbridge for two or more tracks, the work to be completed within five years from the passage of the act. Other railroads are to use this bridge on payment of a reasonable compensation.

The Secretary of War is also authorized to contract for a new highway and street railroad drawbridge to be built within two years and located not less than 500 ft. above the present Long bridge, and to be paid for one-half by the U. S. Government and one-half by the District of Columbia. The bridge is to be equipped only for the underground electric system.

Washington, Pa.—Sealed bids are wanted by the County Commissioners, until March 29, for building stone abutments for bridge over Ten-Mile Creek, near Amity. Also, at the same time and place, bids will be received for building abutments for bridge over Dunn's Creek, at Dunn's Station, in Morris Township. G. E. Lockhart, County Clerk.

Weissport, Pa.—The American Bridge Co. will build for the Central R. R. of New Jersey at this place 12 spans of deck plate girders, each 75 ft. long.

Weldon, N. C.—The Weldon Bridge Co., organized several months ago, has incorporated as the Weldon Bridge & Ferry Co., to build a bridge over Roanoke River about 600 ft. long, on which prices are wanted. T. C. Harrison is interested.

Yazoo City, Miss.—The Supervisors of Yazoo County will let a contract, on April 1, for a bridge over Dunn Mound Slough. S. S. Griffin, Clerk.

Other Structures.

Augusta, Ga.—The Augusta Union Station Co. has applied for a charter in Georgia. We are told that as soon as the company is incorporated it will organize and build the proposed union station for Augusta. Blue prints submitted to the Council some months ago show a structure 153 x 500 ft.

Brooklyn, Iowa.—The Chicago, Rock Island & Pacific will build a 13-stall brick roundhouse at this place.

Burlington, Iowa.—It is stated that the Chicago, Burlington & Quincy will build a new freight house here this summer, on Main street adjoining the old building.

Cape May, N. J.—The Atlantic City R. R. (P. & R.) has bought ground near Cape May for a new passenger station.

Cleveland, Ohio.—D. H. Burnham, Architect, of Chicago, Ill., will make the plans for the proposed union station at Cleveland, Ohio, which will cost about $2,000,000 and be used by the Lake Shore & Michigan Southern, the Cleveland, Cincinnati, Chicago & St. Louis and the Pennsylvania railroads.

Denver, Colo.—The Denver & Rio Grande and the Chicago, Rock Island & Pacific will build a joint freight station between Eleventh and Thirteenth, and Wazee and Hyncoop streets. Plans have been made for building 131 x 640 ft., to cost about $50,000.

Greenville, Pa.—It is announced that work will be begun in the spring on new shops at Greenville for the Pittsburgh, Bessemer & Lake Erie.

Henderson, Ky.—See Bridge Building.

Kansas City, Mo.—The Atchison, Topeka & Santa Fe will build a new depot at its freight terminal at a cost of $40,000.

Missoula, Mont.—It is announced that the Northern Pacific has decided to build a new station and division headquarters at Missoula at a cost of $40,000.

Montreal, Que.—An offer made by Capt. Wolvin, of Duluth, Minn., is reported accepted by the Montreal Harbor Board for building grain elevators at Montreal.

James Crathern has an application before the Harbor Commissioners for a loan of $1,000,000 in exchange for harbor bonds to build two elevators in the harbor.

New York, N. Y.—The Harlem Division of the New York Central & Hudson River R. R. is being double-tracked from White Plains to Mount Kisco. When finished all the stations will be replaced by new buildings.

Philadelphia, Pa.—Secretary Long has approved the finding of a board of naval officers which recommended that for changing the dry dock at Philadelphia from wood to stone the contractors should be allowed 30 months extra time and an increase in price from $782,600 to $1,133,592. The finding was approved some time ago by Rear Admiral Endicott, Chief of the Bureau of Yards and Docks, but the contractors appealed from it. Secretary Long now gives the contractors until April 1 to make a contract on this basis.

Plainville, Conn.—The New York, New Haven & Hartford will build a new station at this place.

Portland, Me.—The new passenger station to be built by the Grand Trunk in Portland will be of stone and two stories high, and will be finished about Aug. 1. The roundhouse and repair shops are to be removed. A third grain elevator with a capacity of 1,500,000 bushels will also be built.

Progreso, Yucatan, Mex.—The American Bridge Co. has a contract through the Schultz Branch of Pittsburgh for a large Government warehouse at Progreso.

Savannah, Ga.—We are told that bids will be wanted, April 15, by the Chief Engineer of the Savannah Union Station Co. for the union passenger station and trainshed on West Broad street. It is to be used by the Seaboard Air Line, Southern Ry. and Plant System. It will be 250 ft. wide and 600 ft. long, including the shed. It will be of brick and stone and steel skeleton. The estimated cost is $150,000.

Scranton, Pa.—Arrangements have been made for removing the mills of the Lackawanna Iron & Steel Co. from Scranton to the new plant at Buffalo, N. Y.

Terre Haute, Ind.—The Highland Iron & Steel Co. has been organized to build a rolling mill at this place. The capital stock is to be $300,000, and the officers are: President, Philip Matter, of Marion; Vice-President, J. L. Smith, Muncie; Secretary, W. M. Myers, Muncie; Treasurer and General Manager, W. C. Ely, Marion. It is stated that some contracts have been placed for equipment.

Troy, N. Y.—The new station proposed by the New York Central at Troy will be built so that the tracks can be elevated without any essential changes in the building. The plans provide for a brick and stone structure 50 x 400 ft., to cost about $150,000.

Washington, D. C.—Bids will soon be asked at Washington for a fire-proof building to cost $50,000 to be built at the Marine Barracks in that City for the headquarters' office of the Marine Corps.

The Architect of the Capitol has been authorized by Congress to prepare and submit at its next session plans, specifications and estimates of cost for rebuilding and extending in a fire-proof manner the central part of the Capitol building on its east front, so that it will be on a line with the two wings; also for the renovation and decoration of the rotunda and for a fire-proof building adjacent to the Capitol grounds to be used for offices, storage and power purposes in connection with the Capitol. During the coming year about $300,000 will be spent in improvements in addition to the usual amount expended to keep the building in good order. The roofs of the two parts of the building which connect the rotunda with the two wings are to be rebuilt and made fire-proof and flat instead of dome-shaped, and at a cost of over $150,000.

West Milwaukee, Wis.—Plans for the enlargement of the West Milwaukee car shops of the Chicago, Milwaukee & St. Paul are under consideration.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xii.)

Boston Society of Civil Engineers.

At the annual meeting of the Boston Society of Civil Engineers, held on the 20th inst., the following officers were elected: President, Lawson B. Bidwell; Vice-Presi-

dent, X. Henry Goodnough; Treasurer, Edward W. Howe; Secretary, S. Everett Tinkham; Librarian, Louis F. Cutter; Director, Wm. M. Brown, Jr.

The annual reports showed the Society to be in good condition both financially and numerically. Its membership at date of the meeting was exactly 500, and its Treasurer reported that the funds of the Society were very nearly $15,000. The paper of the evening was read by Mr. J. A. Ockerson, of St. Louis, a member of the Mississippi River Commission, and entitled "The Mississippi River, Some of Its Physical Characteristics and Measures Employed for the Regulation and Control of the Stream." The paper was illustrated by lantern slides.

The American Street Railway Association.

The Twentieth Annual Meeting of the American Street Railway Association will be held in Madison Square Garden, New York city, Wednesday, Thursday and Friday, October 9, 10 and 11, 1901. Papers will be presented on "Electric Signals on Suburban and Interurban Railways, Single or Double Track;" "Storage Batteries as Auxiliaries to Power Plants," "The Economies Resulting from the Use of Four Motors Instead of Two on Double-Motor Equipments," "The Best Form of Car for City Service: A Consideration of the Various Types of Car as to Size of Car and Arrangement of Seats, Including Best Types of Brakes and Wheels;" "Practical Results Obtained from Three-Phase Transmission and Rotary Transformers or Motor Generators in Transmitting Power," "Relations of Interurban and City Railways," "The Modern Power House, Including the Use of Cooling Towers for Condensing Purposes," etc.

The New York Railroad Club.

At the meeting of the New York Railroad Club March 21, the papers presented by Mr. W. P. Pressinger and Mr. Thomas Aldcorn brought out a large attendance. Mr. Pressinger's paper was on "Compressed Air in Railroad Service," and Mr. Aldcorn spoke of "Railroad Uses of Pneumatic Tools." Lantern slides illustrating both papers were used, Mr. Aldcorn giving his attention to the smaller pneumatic tools and devices, while Mr. Pressinger's paper had to do with the more general use of compressed air on railroads, as, for example, in painting, cleaning upholstery, and pumping water with the air lift. The papers were well received, and brought out some discussion on points of usage in detail, chief of which were reheating air before using it in tools or motors, and the desirability of using air expansively. Mr. A. W. Matson gave a description of a compressed air plant used in work done at Jerome Park.

Some slight changes of conditions upon which names of applicants for membership are received and members admitted to the club were adopted as amendments to the constitution and by-laws. The names of 41 new members were read and 29 names were presented with application for membership. President Vreeland announced that it had been evident for some time that the club membership had outgrown its quarters, and that it seemed advisable to arrange for a more commodious meeting place; that at a meeting of the Executive Committee the matter had been taken up and a sub-committee appointed to see what could be done and report.

The subject of the paper for the April meeting will be "Track Elevation Through Cities," by Mr. C. W. Buchholz, Chief Engineer of the Erie.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Prof. S. W. Stratton, recently appointed Director of the National Bureau of Standards, has resigned from the Department of Physics, University of Chicago, and will shortly go to Europe to study systems of weights and measures and the standardizing laboratories in England, Germany, France and Austria.

—Mr. R. S. Logan, Vice-President and General Manager of the Central Vermont, was born Feb. 13, 1864. He entered the railroad service in 1885, with the Receivers of the Wabash, St. Louis & Pacific (Wabash) as clerk in the office of General Manager A. A. Talmage. In December, 1890, he became Secretary to the General Manager of the Wabash. Six years later was appointed Secretary to the General Manager of the Grand Trunk, and on Jan. 1, 1901, he became assistant to the General Manager. Mr. Logan took his new position with the Central Vermont on March 15 last.

—Mr. Nelson O. Whitney, Professor of Railway Engineering at the University of Wisconsin, died at Madison March 18. He was a good engineer, a strong and able man, and his death is a real loss to the University and to the profession. He was born at Aiken, S. C., May 3, 1858, and graduated in civil engineering at the University of Pennsylvania in 1878. Until 1891 he had a varied experience in the field, mostly in railroad surveys and construction. His latest appointment of that sort was as Assistant Engineer on the Pennsylvania Railroad in charge of construction and maintenance at Chicago. He had been ill for a year and a half, the result of a severe attack of pneumonia, but he was extremely reluctant to give up his University duties and finally met the students at his home. He became a member of the American Society of Civil Engineers March 1, 1893.

—Mr. S. Higgins, who is to be the new Superintendent of Motive Power of the Union Pacific, was born in San Francisco, Cal., Feb. 19, 1860. After graduating from the Sheffield Scientific School in 1881, he entered the Erie shops as a special apprentice at Susquehanna, Pa. Five years later he became General Foreman of the shop. On leaving Susquehanna Mr. Higgins went to Buffalo as Assistant Engineer of Motive Power. This position he held until 1887, when he was appointed Master Mechanic at Cleveland of the Mahoning Division of the Erie lines west of Salamanca. The following April he was transferred to Galion in a similar capacity, later becoming Master Mechanic of the Eastern Division at Meadville. In 1892 he became Assistant Superintendent of Motive Power in charge of the work west of Salamanca, including the New York, Pennsylvania & Ohio and the Chicago & Erie railroads, remaining in this position until 1894. In that year he went to the Lehigh Valley, where he became Superintendent of Motive Power. Mr. Higgins has been an active member and Vice-President of the New York Railroad Club, and has served on a standing committee of the Master Mechanics' Association. He has the advantages of strength and comparative youth, and has a great opportunity.

—Mr. Charles P. Clark, lately President of the New York, New Haven & Hartford, died at Nice, France, March 21. At the time of his resignation, November, 1899, we published a short sketch of his career. The following is from the New York *Evening Post*, and we guess from internal evidence that it was written by Mr. Clarence Deming. It corrects some minor errors in accounts heretofore published, and altogether is an excellent appreciation of the man and of his relations to the New England railroads:

"With the death of Charles Peter Clark passes the great railroad architect of New England, and a man, in a large sense, one of the great railroad organizers of the country. His rapid and brilliant railroad career was the more impressive because up to his thirty-fifth year he had no railroad training, and the achievements of the last twelve years of his life as a railroad President were the outcome of a natal force and gift of organization rather than of technical experience or acquirement.

"He was the son of Peter and Susan (Lord) Clark, and was born at Nashua, N. H., Aug. 11, 1836, with parents whose ancestry on both sides reached back to Mayflower stock. A liberal education was planned for the boy, and he entered Phillips Academy, Andover, Mass., passing in due course the entrance examination for Dartmouth College in 1852, at the age of 16, but ill-health forced him to surrender a college career. He purchased a small vessel for the African trade, on giving up college work, but in 1862 sought service in the United States Navy. He commanded the "Sea Bird" and the iron-clad gunboats "Carondelet" and "Benton" of the Mississippi squadron, seeing always hard service. At the age of 34 began modestly his railroad career as clerk of the receivers of the now long-extinct Boston, Hartford & Erie. Mr. Clark's energy and broad, quick grasp of railroad matters soon carried him to the front of the reorganized corporation, which, under extreme difficulties, he managed with such success that in 1881 he became Vice-President of the New Haven Company, only to be recalled two years later, as receiver, to the again moribund New England. Once more he set the ill-starred corporation on its feet, and in 1887 was called to be head of the New Haven Railroad Company, and to develop the great system which is now its builder's monument.

"The New Haven Railroad of 1887 was a local line, with Western terminals at Woodlawn and Harlem, and ending northward and eastward at Northampton, Springfield, Willimantic and New London. Its directors rather scorned freight traffic, because it was business which did not 'handle itself.' The company was paying 10 per cent. yearly dividends and ploughing in surplus, but its methods were slow, and it had no far-sighted policy as against threatened competition which had already begun to come into sight. Mr. Clark faced the problems of the situation with vigor. In 1892 came the merger with the New York, Providence & Boston system, carrying with it control of the Stonington & Providence boat lines. Mr. Clark's next plan of leasing at 10 per cent. the Connecticut River Road was thwarted by the dramatic stroke of President McLeod, of the Reading and Boston & Maine, who bought up Connecticut River stock at a great price. Owing to McLeod's effort, a little later to obtain the Old Colony system, that large property, too, passed as an alternative to the control of Mr. Clark's corporation. In a year or two more the Housatonic system was bought up, and in 1895 the purchase of the New England with its associated boat line completed the New Haven's territorial railroad monopoly of southern New England, and very largely control of boat line traffic on the Sound.

"Along with this swift railroad absorption came immense physical changes in the property itself. The main stem between New York and New Haven was almost completely four-tracked, the Shore Line double-tracked, the block system established, the Harlem terminal vastly enlarged, so as to increase the freight traffic, the great Boston passenger station constructed.

"In this complete reversal of the old policy of the conservative corporation Mr. Clark met and mastered considerable opposition in his own Board of Directors. He incurred also some criticism by stockholders for free spending and for laxity in details. But in his tireless and successful activities, which finally wrecked Mr. Clark's health, when he might have elected ease as head of the old corporation in 1887, his critics never charged that he acted save with a single eye to the interests of his company and its stockholders."

ELECTIONS AND APPOINTMENTS.

Arkansas Southwestern.—The officers of this company are: President, William Grayson; Vice-President, N. W. McLeod; Secretary, G. H. Grayson, and Treasurer, W. E. Grayson. (See R. R. News column.)

Bessemer & Lake Erie (Pittsburgh, Bessemer & Lake Erie).—The officers of this company, which will, on April 1, assume control, as lessee, of all the properties of the Pittsburgh, Bessemer & Lake Erie, are: J. H. Reed, President; James Gayley, Vice-President; R. A. Franks, Secretary and Treasurer; F. E. House, General Manager; E. H. Utley, General Freight and Passenger Agent; D. Hum, Jr., Auditor; H. T. Porter, Chief Engineer; J. S. Matson, Superintendent; E. B. Gilbert, Master Mechanic; J. M. Ritchie, Purchasing Agent, and J. J. Saint, Land Agent.

Canadian Pacific.—J. E. A. Robillard has been appointed Division Superintendent at Quebec, Que., succeeding W. C. Hall, resigned. W. J. Singleton will, in addition to his duties as Superintendent of Terminals, assume the duties of Superintendent of the Ottawa Section, succeeding Mr. Robillard, effective March 14.

Chateaugay & Northern.—The officers of this company are: President, D. Murphy, Ottawa; Vice-President, H. H. Melville, Boston, and Managing Director, J. P. Mullarky, Montreal. The Directors are: Charles Magee, Ottawa; S. H. Ewing, Montreal; John Joyce, Lowell, Mass.; James McNaught, New York, and C. H. Catelli, Montreal. (See R. R. Construction column.)

Chicago Great Western.—T. N. Hooper, Assistant General Freight Agent at St. Paul, Minn., has resigned. F. H. Lord, General Passenger Agent, with headquarter at Chicago, Ill., has resigned.

Chicago, Rock Island & Pacific.—W. J. Leahy has been appointed Assistant General Passenger Agent, succeeding the late C. Kennedy.

Chicago Terminal Transfer.—Edward D. Adams has resigned as Chairman of the Executive Committee and has been succeeded by President J. N. Faithorn.

Erie & Wyoming Valley (Erie).—At a meeting of the Board of Directors of the E. & W. V., held March 21, the following officers were elected: J. Lowber Welsh, President; G. M. Cumming, First Vice-President; J. A. Middleton, Third Vice-President and Secretary; J. T. Wann, Auditor, and J. W. Platten, Treasurer. This company will hereafter be operated as the Wyoming Division of the Erie, and the following officers will at once assume charge of their respective departments and appoint their subordinates: Messrs. Cumming, Middleton, Wann and Platten, as above; C. R. Fitch, General Manager; C. W. Buchholz, Chief Engineer; A. E. Mitchell, Superintendent of Motive Power; E. B. Sheffer, Purchasing Agent, and F. L. Blendinger, Superintendent of Telegraph. The jurisdiction of the following officers of the Erie is extended over the Wyoming Division: Geo. Van Keuren, General Superintendent; G. A. Thompson, Superintendent of Transportation; Geo. Sergeant, Jr., Engineer Maintenance of Way; W. Lavery, Assistant Superintendent of Motive Power; H. B. Chamberlain, Eastern Freight Traffic Manager; D. I. Roberts, General Passenger Agent, and O. F. Georgi, Special Claim Agent. Geo. T. Slade has been appointed Superintendent, with headquarters at Dunmore, Pa.

Gulf, Colorado & Santa Fe.—The headquarters of W. B. Scott have not been removed to Brenham as stated last week (p. 209).

Kansas City Southern.—J. M. Scrogin, heretofore Master Mechanic of the St. Louis Southwestern of Texas, has been appointed General Foreman of the K. C. S.

Lehigh Valley.—Owing to ill health E. F. Swart, Division Engineer at Auburn, N. Y., has resigned.

Louisville & Nashville.—Jas. Ashworth has been appointed Master Mechanic, with headquarters at Birmingham, Ala.

Missouri Pacific.—Wm. H. Bush has been transferred to Sedalia, Mo., as Assistant Engineer, succeeding H. Rohwer, promoted. C. A. Chandler, heretofore Resident Engineer of the Wabash at Moberly, Mo., has been appointed Assistant Engineer of the M. P., at Atchison, succeeding Mr. Bush.

Mobile & Ohio.—On Wednesday, March 20, Samuel Spencer, A. B. Andrews and W. W. Finley were elected Directors, succeeding James H. Fay, W. B. Duncan, Jr., and W. E. Roosevelt, resigned. Mr. Spencer was elected President, Mr. Andrews First Vice-President and Mr. Finley Second Vice-President.

New York Central & Hudson River.—H. Fernstrom, heretofore Chief Engineer of the St. Joseph & Grand Island, will accept a position with the N. Y. C. & H. R. H. A. Smith has been appointed Commissary Agent, with headquarters at Boston, Mass.

Peninsular.—Geo. Lovelace has been appointed Purchasing Agent and Acting General Manager, succeeding A. Johnson, resigned. Mr. Lovelace is succeeded as Master Mechanic by Chas. A. Wiss.

Pennsylvania Company.—I. W. Geer has been appointed Engineer Maintenance of Way of the Northwest System, with headquarters at New Castle, Pa., succeeding H. W. Thornton.

San Pedro, Los Angeles & Salt Lake.—The officers of this company are: President, W. A. Clark; Vice-Presidents, R. C. Kerens, St. Louis; J. R. Clark, Butte, Mont.; and T. F. Gibbon, Los Angeles, Cal. (See R. R. Construction column.)

St. Louis, Iron Mountain & Southern (Missouri Pacific).—J. M. Herbert, heretofore Superintendent at Osawatomie, Kan., of the M. P., has been appointed General Superintendent of the St. L., I. M. & S., succeeding E. A. Peck, effective April 1.

St. Joseph & Grand Island.—H. W. Milliman has been appointed Auditor, succeeding J. F. Elder, resigned. H. Fernstrom, Chief Engineer, with headquarters at St. Joseph, Mo., has resigned. (See New York Central.)

Southern Missouri & Arkansas.—Stephen E. Coombs has been appointed Chief Engineer, having full charge of all engineering and construction, effective April 1.

Tennessee Central.—F. M. Bisbee, formerly Superintendent of Tracks, Bridges and Buildings of the St. Louis & San Francisco, has been appointed Chief Engineer of the T. C., with headquarters at Nashville, Tenn. Mr. Bisbee is also General Manager of the Tennessee Construction Company.

Toledo & Chicago.—The officers of this company, mentioned last week to build a railroad for the Wabash, are: President, J. L. Ramsey; Vice-President, A. L. Smith; Secretary, E. B. Prior, and Treasurer, T. L. O'Leary.

Wrightsville & Tennille.—D. R. Thomas has been appointed Auditor, succeeding H. W. Milliman, resigned to accept service elsewhere. W. B. Kendrick has been elected Treasurer, succeeding Mr. Thomas. Car mileage reports and correspondence relative to the movement of cars should be addressed to T. T. Hollomon, Superintendent, effective April 1.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

CALIFORNIA EASTERN.—A contract is let to Bridge & Crandall, of San Bernardino, Cal., to build 20 miles of railroad from Vanderbilt to Ivanpah.

CANADIAN NORTHERN RAILWAY & TRANSPORTATION.—A bill is before the Canadian Parliament to incorporate this company to build a railroad between Collingwood, Ont., and Toronto, 70 miles. The chief promoter is Mr. Archibald Campbell, former member of Parliament.

CANADIAN PACIFIC.—The Railway Committee of the Lower House of the Canadian Parliament has reported favorably the South Ontario Pacific bill. The road proposed is for an extension of the Canadian Pacific from Woodstock, Ont., east 95 miles to Niagara River, opposite Buffalo, N. Y., and for a bridge over the river and Grand Island to reach Buffalo.

CHATEAUGAY & NORTHERN.—The directors, at a meeting in Montreal last week, reorganized and decided to push forward the enterprise, and are about to secure bids for the proposed railroad from Montreal to Joliette. This includes a bridge which is mentioned in the Bridge Department this week. The new officers are mentioned under Elections and Appointments.

CHEAT VALLEY.—It is reported that negotiations are under way to secure the capital for building 15 miles of road. Surveys are made and considerable right of way is secured. J. J. Stoer, President, Philadelphia, Pa.

CHESAPEAKE & WESTERN.—It is reported that Messrs. August Belmont & Co., of New York, have become interested in this property and will extend the road to tidewater on Chesapeake Bay; also west to coal fields in West Virginia.

A contract is let to Carpenter, Wright & Co., of Richmond, Va., to build an extension 14 miles long from Bridgewater, the present western terminus.

CHICAGO & NORTHWESTERN.—The Chicago, Milwaukee & St. Paul will spend considerable money for improving the road between St. Paul and Spooner, Wis., about 99 miles. An officer of the company is reported as saying that about $200,000 will be spent this season in reducing grades, ballasting and removing curves.

CINCINNATI & NORTHEASTERN.—This company, which has a charter many years old for a steam railroad in the city of Cincinnati, to be used for connections with the "Big Four," has made application to the city for a new franchise. W. C. Shepard is Director and General Counsel.

CLEVELAND & SOUTHERN.—The contract for building and equipping this electric railroad has been let to the Osborn Engineering Co. of Cleveland, Ohio. The road is proposed from Cleveland to Berea, Medina and Wooster, between 40 and 50 miles, over private right of way. The capital stock is $1,000,000 and the bonds $1,000,000. (Construction Supplement, March 8, 1901.)

COLORADO RIVER & GULF.—This company is reported incorporated in California, with a capital stock of $50,000, to build a railroad from Yuma, south to mines on the Colorado River. John P. Jones, of New York, and Henry Vanderlick and Wm. S. Allen, of Los Angeles, Cal., are interested.

CONNECTICUT ROADS.—Capitalists of Springfield, Mass., are reported to have a charter from the Connecticut Legislature for a third-rail electric railroad from Springfield, Mass., to Rockville, Conn., a distance of 25 miles.

COPPER RANGE.—An officer writes that a branch is proposed from Painesdale Junction, Mich., one mile south of Atlantic Station, on the main line, northwesterly to Freda, on the shore of Lake Superior, about 11 miles. Surveys are finished and work has recently been begun by Contractor C. J. Johnson, of Minneapolis, Minn., and Houghton, Mich., who will do all the grading, track laying, bridging, etc. The work is mostly earthwork, running from 10,000 to 32,000 yds. to the mile. There are four wooden trestle bridges, the most important of which is 700 ft. long, the average heights of the bridges being 60 ft. The Illinois Steel Co. will supply the 75-lb. rails.

CRAWFORD COUNTY STREET.—This company, which was reported organized last week, was incorporated in Pennsylvania Feb. 21, with a capital stock of $90,000. The road proposed is from the Borough of Townville to Lyona, through Blooming Valley to Meadville. Stephen Newburn, of Bellevue, is President.

DES MOINES, IOWA CITY & EASTERN.—This company was incorporated in Iowa, March 16, to build a railroad from Des Moines to Montezuma; thence to Williamsburg, Iowa City and east to connect with some trunk line. George W. Ball, President; D. G. Lyons, Treasurer and General Manager.

DETROIT, YPSILANTI & ANN ARBOR.—This company has given a mortgage to the Detroit Trust Co. for $2,000,000 to secure bonds to pay for an extension from Ann Arbor to Jackson.

ESCANABA & LAKE SUPERIOR.—Right of way is reported secured for the proposed 22 miles of extension to Boney Falls, Mich. The contracts will be let in April. J. W. Wells, General Manager, Menominee, Mich.

GREAT NORTHERN.—The contract for the seven-mile cut-off between Kalispell and Liberty Creek, Mont., is reported let. Work is to be begun April 1.

HUMBOLDT.—This company was incorporated in California, March 13, with a capital stock of $2,000,000, of which $249,700 is subscribed. The directors are: A. B. Hammond, C. W. Fenwick, W. G. Gosslin, H. L. Waldron and M. J. Ward.

ILLINOIS CENTRAL.—An extra track will be built between Jackson, Miss., and Crystal Springs, about 25 miles.

IOWA ROADS.—L. G. Everest, President of the Empire Coal Co., of Des Moines, Iowa, according to report, has let a contract to Price Bros. for eight miles of standard gage railroad in Marion County, to begin at Lacey, Iowa.

JACKSONVILLE, ST. MARY'S & JESUP.—J. E. Starke, President of this company, which was reported last week under Florida Roads, is reported as saying that work will be begun in April on the proposed 100 miles. Roland Woodward is Chief Engineer.

KANSAS CITY, MEXICO & ORIENT.—A. E. Stilwell, of this company, is reported to have received a concession from the Mexican Government to build the road through Mexico, with two branches. A concession for the main line carries with it a bonus of $9,000 per kilometer. The K. C., M. & O. has taken out a charter in the State of Kansas, with a capital of $75,000,000. Mr. Stilwell and associates have organized the United States & Mexican Trust Company, with a capital of $2,500,000, which is to act as trustee of the Orient Road. Mr. Stilwell will be President.

KANSAS, EASTERN OKLAHOMA & TEXAS.—It is stated that contracts will be let about June 1 for this proposed road, which will be about 350 miles long, from Cherryvale, Kan., through Bartlettsville, Ind. T., Cleveland, Okla. T., Jennings, Shawnee and Henrietta, Tex. J. A. Donald, of Jennings, Okla. T., is Chief Engineer; J. A. Burkholden, President.

LAKE ERIE, ALLIANCE & WHEELING.—The Cleveland Trust Co. is receiving subscriptions to the capital stock of this company, a consolidation of the Ohio River & Lake Erie and the Alliance & Northern, which will build 28 miles from Bergholz, Ohio, to Dillonvale, to reach coal fields in Jefferson County, Ohio. The capital stock is $3,500,000.

LONG ISLAND.—The New York State Senate has passed over the veto of the Mayor of New York the Atlantic Avenue railroad bill which provides for the removal of the Long Island tracks on Atlantic avenue, Brooklyn, from grade.

MARYLAND ROADS.—Peter J. Ford, of Wilmington, Del., is one of the promoters of a railroad proposed from Elkton, Md., along the eastern shore of Chesapeake Bay.

MASSENA & NORWOOD.—This company was incorporated in New York State March 23 with a capital stock of $150,000 to build a steam railroad about 13 miles long in St. Lawrence County. The directors are: Robert Swan, W. J. McKinney and W. J. Patch, of Massena.

MEXICAN NATIONAL.—In connection with the taking over by Speyer & Co. of the stocks and bonds of the Mexican National owned by the Nexican National Construction Co., it is said that the plan outlined by President Raoul, and set forth in the annual report for the year ending 1899, to change the road to standard gage and put the property in first class condition, will now be carried out. On March 22 three representatives of Speyer & Co. were elected to the Board of Directors, viz.: Martin Erdmann, Henry W. Taft and Gabriel Morton, succeeding directors of the Construction Company.

MISSOURI & IOWA SOUTHERN.—It is reported that work will be begun in the spring on the 53-mile extension from Sedalia, Mo., north to Miami, Iowa.

NEW YORK & OTTAWA.—General Manager H. W. Gays is reported as saying that work will be begun at the new terminals at Ottawa, Ont., as soon as the weather will permit. The roundhouse, turntable, freight house, sidings, etc., will be pushed through to early completion. The road connects with the New York Central & Hudson River R. R. at Tupper Lake, N. Y.

NORTHERN PACIFIC.—Application has been made to the State Department of Oregon regarding the proposed branch line in Columbia County, Ore., to begin at or near Scappoose Station, to run along the valleys of the north fork of Scappoose Creek and the Nehalem River to Pittsburgh, Ore., on the Nehalem River, about 21 miles.

NORTHWESTERN ELEVATED (CHICAGO).—This company is arranging for an extension from its present terminal at Wilson avenue to Ravenswood, to be finished by 1903.

PENDLETON & POCAHONTAS.—This company was incorporated in West Virginia, March 24, to build a railroad from Keyser, W. Va., on the Baltimore & Ohio, south about 70 miles to Franklin, W. Va. The U. S. Leather Co., of New York, is reported interested. Eugene Horton, of New York; Thomas G. Pownall, of Cumberland, Md., and E. B. Reynolds, of Keyser, W. Va., are incorporators. The capital is $800,000.

PENNSYLVANIA.—The controversy between the Pennsylvania, the Philadelphia & Reading and Belt Line Railroads regarding additional tracks on Delaware avenue is reported settled, whereby three tracks will be built on that avenue.

The Philadelphia & Erie is receiving bids for building the second track work outlined in the recent annual report from Keating to Lock Haven, Pa., 24 miles.

PHILADELPHIA & LEHIGH VALLEY TRACTION.—Albert L. Johnson, President of the Lehigh Valley Traction, of Allentown, Pa., has given notice that under the name of the Philadelphia & Lehigh Valley Traction Co., he proposes to build an electric railroad connecting Philadelphia and New York. The P. & L. V. T. is capitalized at $5,000,000 each of stocks and bonds.

PITTSBURGH & CARNEGIE.—This company is asking for a franchise through certain streets of Pittsburgh, and promises to begin work within six months. It is stated the project is in the interest of the Wabash. The ordinance says it is the intention to have the road connect with western lines and also run through West Virginia and Ohio.

PLANT SYSTEM.—Surveys are about finished for a cut-off 52 miles long on the Savannah, Florida & Western, from Jesup to Folkston, Ga.

PROVIDENCE & FALL RIVER STREET.—This company was incorporated early in March to build an electric railroad about 14 miles long connecting Fall River and Providence, R. I. John J. Whipple is President.

QUEBEC & LAKE ST. JOHN.—The company has decided to build from Valcartice to St. Catharines, Ont., four miles.

RICE LAKE & NORTHERN.—This company was incorporated in Wisconsin, March 14, to build a railroad from Rice Lake to Ashland, Wis., about 100 miles, through the counties of Chippewa, Barron, Washburn, Sawyer, Bayfield and Ashland. The incorporators are: George Fuller, of St. Paul; George M. Huss, of Chicago; J. E. Horsman, of Rice Lake, and Clarence C. and Aruthur E. Coe, of Barron, Wis.

ST. JOSEPH UNION DEPOT.—The company has decided upon final plans for straightening the tracks at the south entrance to the station and will next take up the question of building new sheds.

SAN PEDRO, LOS ANGELES & SALT LAKE.—This company has filed incorporation papers at Salt Lake City, Utah, showing an authorized capital stock of $25,000,000. The road will begin at and run eastward from Los Angeles through Puente, Pomona and Ontario to Riverside, paralleling the Southern Pacific at places. Much right of way is reported secured and work will be begun in about 30 days.

SAVANNAH UNION STATION.—Bids are wanted, until April 1, by T. S. Tutwiler, Engineer, Sorrel Bldg., Savannah, Ga., for building the yard and lines approaching the proposed station. The work includes 400,000 cu. yds. of earthwork, 7,000 lin. ft. of trestle work and 48,000 cu. ft. of brick masonry. See also Other Structures.

SCHUYLKILL TRACTION.—This Philadelphia (Pa.) company has authorized a new mortgage of $2,000,000 to provide for extensions, for refunding, etc. It is said that Director Clarke Merchant will be made President.

SOUTHERN PACIFIC.—President Hays is reported as saying that the company proposes to extend its policy of straight track and low grades, and with this object in view large contracts will be let in the near future which will shorten the road between San Francisco and Ogden by building a number of cut-offs.

SOUTH WEST VIRGINIA.—This company was incorporated in West Virginia, March 21, to build a railroad from Tug River to Coal River in the southeastern part of the state, and to develop coal mines. The incorporators are: L. C. Anderson, A. A. Shawkey, M. P. Shawkey, A. H. Miller, of Charleston, and A. Bell, of West Liberty.

UNION SPRINGS & NORTHERN.—This company has been incorporated in Alabama to build a railroad from Union Springs to Fort Davis, Ala., 6½ miles. President W. M. Blount, of Union Springs, Ala., wants prices on material and equipment. (Construction Supplement, March 8, 1901.)

VIRGINIA & SOUTHWESTERN.—A five-mile extension is proposed from Vaughtsville to Mountain City, Tenn. Cornelius Shields, President and General Manager, Bristol, Tenn.

A 35-mile extension is reported under consideration between Clinchport and St. Paul, Va.

WESTERN MARYLAND.—Surveys are reported being made for an extra track between Hagerstown, Md., and Potomac Valley Junction.

GENERAL RAILROAD NEWS.

ARKANSAS SOUTHWESTERN.—This railroad, formerly the Southwestern Arkansas & Indian Territory, which runs from Smithton to Pike City, in Southwestern Arkansas, a distance of 34 miles, was, on March 15, transferred to its new owners, Grayson & McLeod, whom it is said bought the property in the interest of the St. Louis, Iron Mountain & Southern. The officers and directors are given under Elections and Appointments.

ATCHISON, TOPEKA & SANTA FE.—A bill has been introduced in the Texas Legislature to authorize the Gulf, Colorado & Santa Fe to buy the Gulf, Beaumont & Kansas City and the Gulf, Beaumont & Great Northern Railroads, and to operate them under the charter of the Gulf, Colorado & Santa Fe.

CANADIAN NORTHERN.—President Mellen, of the Northern Pacific, has notified the Government of Manitoba that it must be prepared to take over the company's lines in Manitoba on April 1. Any delay, he says, will result in nullification of the contract. The Dominion Government at Ottawa must ratify the contract before it is effective. The particulars of the lease of the Northern Pacific lines in Manitoba to the Canadian Northern were set forth in an editorial in the *Railroad Gazette*, Feb. 22 (p. 129).

CLEVELAND, ELYRIA & WESTERN.—W. E. Hutton & Co., of Cincinati, Ohio, are offering at 102½ and interest $225,000 of this company's consolidated first mortgage 5s of 1900, due Aug. 1, 1920.

COLUMBIA RAILWAY & NAVIGATION.—Archibald A. Hutchison, holder of $700,000 mortgage bonds of the C. R. & N., has filed papers in intervention at Goldendale, Wash., in the suit of Winters & Chapman against the Central Navigation & Construction Co., his object being to prevent the Central Co. from acquiring the Columbia Company's rights in the Portage road, and to clear the way for foreclosure proceedings.

DETROIT & LIMA NORTHERN.—The depositing bondholders have approved the sale of this road under the conditions described in this column March 8, p. 178.

EEL RIVER.—According to report this property will be put up for sale within a few weeks under the court decree.

GADSDEN & ATTALLA UNION.—At the foreclosure sale, on March 20, the property was sold for $50,000 to T. S. Kyle, representing the bondholders.

ILLINOIS CENTRAL.—See Minneapolis & St. Louis.

KANSAS CITY, FORT SCOTT & MEMPHIS.—See Kansas City, Clinton & Springfield.

KANSAS CITY, CLINTON & SPRINGFIELD.—A circular announces that plans are made for the exchange of six shares of the stock of this company for one share of the common stock of the Kansas City, Fort Scott & Memphis, preparatory to the consolidation of these companies.

LOUISVILLE & NASHVILLE.—Two hundred and ninety-four general mortgage bonds of the L. & N. have been drawn for redemption at 10 per cent. premium on June 1.

MINNEAPOLIS & ST. LOUIS.—President Hawley announces that the negotiations for a consolidation with the Illinois Central have been declared off. The M. & St. L. is now earning nearly 11 per cent. on the common shares and wants a guarantee of more than 4 per cent. annual dividends which the Illinois Central offered.

PEORIA & EASTERN.—It is stated that the long-pending suit to decide the ownership of the underlying bonds in the hands of the reorganization committee of what is now the Peoria & Eastern Ry. was decided last week in the U. S. Circuit Court in favor of that railroad. The decision permits the company to pay off all its indebtedness to the Cleveland, Cincinnati, Chicago & St. Louis and have a surplus. The decree further requires the reorganization committee to deliver to the railroad $5,218 cash, $117,000 consolidated 4 per cent. bonds, $108,000 income bonds, $100,800 stock and 2,500 shares of Peoria & Pekin Union stock.

SEABOARD AIR LINE.—Vermilye & Co. and Hallgarten & Co. have bought the $10,000,000 of 5 per cent. gold funding and refunding bonds mentioned last week (p. 210). Steps are now being taken to absorb the constituent companies by absolute consolidation.

TEXAS SOUTHERN.—S. P. Jones informs us that he and two associates who owned this 15½ miles railroad have sold the property to L. E. Walker and associates. Mr. Jones remains as a director and will still act as attorney for the company.

TEXAS, SABINE VALLEY & NORTHWESTERN.—A bill has been introduced in the Texas Legislature authorizing the Texas, Sabine Valley & Northwestern, the Texas & Sabine Valley and the Marshall, Timpson & Sabine Pass railroads, or either of them, or any two of them, to sell their railroad to any corporation to be chartered for the purpose of building a railroad from either the terminus of the Texas & Sabine Valley at Boren, in Panola County, south through the counties of Panola, Shelby, St. Augustine, Jasper, Orange and Jefferson to some point in Texas, on the Gulf of Mexico; or from the terminus of the Marshall, Timpson & Sabine Pass at Timpson, in Shelby County, south through the counties of Shelby, St. Augustine, Jasper, Orange and Jefferson to some point on the Gulf Coast; and to build a railroad northward from the terminus of the Texas, Sabine Valley & Northwestern at Longview, in Gregg County, through the counties of Gregg, Upshur, Kemp, Ward, Franklin, Hopkins, Delta and Lamar to a point on the State line between Texas and Indian Territory. The three railroads named form a connecting line about 60 miles long. The proposed new mileage under the provision of the bill is about 300.

UNION PACIFIC.—At a special meeting of the stockholders held in Salt Lake City, Utah, March 24, it was voted to amend the articles of association increasing the capital stock by $100,000,000. They also approved the action of the Board of Directors for an issue of $100,000,000 4 per cent. bonds. This action was taken in connection with the recent purchase of the Southern Pacific securities. The new 4 per cent. bonds are to be exchanged during the next five years for Southern Pacific bonds and new stock will be issued to cover the purchase of the S. P. The total capitalization of the Union Pacific is now $295,429,400.

WHITE PASS & YUKON.—At a meeting of the shareholders in London on March 11 an increase was authorized in the ordinary stock from £1,000,000 to £1,700,000, the entire issue to be of one class. It is proposed to sell at once £100,000 new shares to pay off cash advances. These shares will be entitled to 5 per cent. dividend which it is expected to pay at an early date out of the surplus earnings of the year 1900. In regard to the application of the balance of the new stock (£600,000) Hon. S. Carr Glyn said in part at the meeting:

> The proposal which we hope to make at the annual meeting is to issue £330,000 of full-paid shares (to represent earnings diverted to improvements) and to distribute them as a bonus at the rate of 30 per cent., that is, 10 per cent. per annum since the enterprise was started, to the holders of £1,100,000 of shares. Of the balance of the new capital £255,555 will be held in reserve to be issued to provide cash to pay off the like amount of debentures that are being issued to the Canadian Development Co. in payment for their fleet, good will, etc., and there will then remain a balance of shares of the value of £14,450. But in the meantime, before these shares can be issued, there is a large amount of liabilities of the company, amounting to a sum considerably over £100,000, which have to be met before June 30, and I am glad to say that Messrs. Close Bros. & Co. have agreed to finance the same on the terms that they shall have the call of the £255,555 shares above mentioned at par up to Dec. 31, 1903.